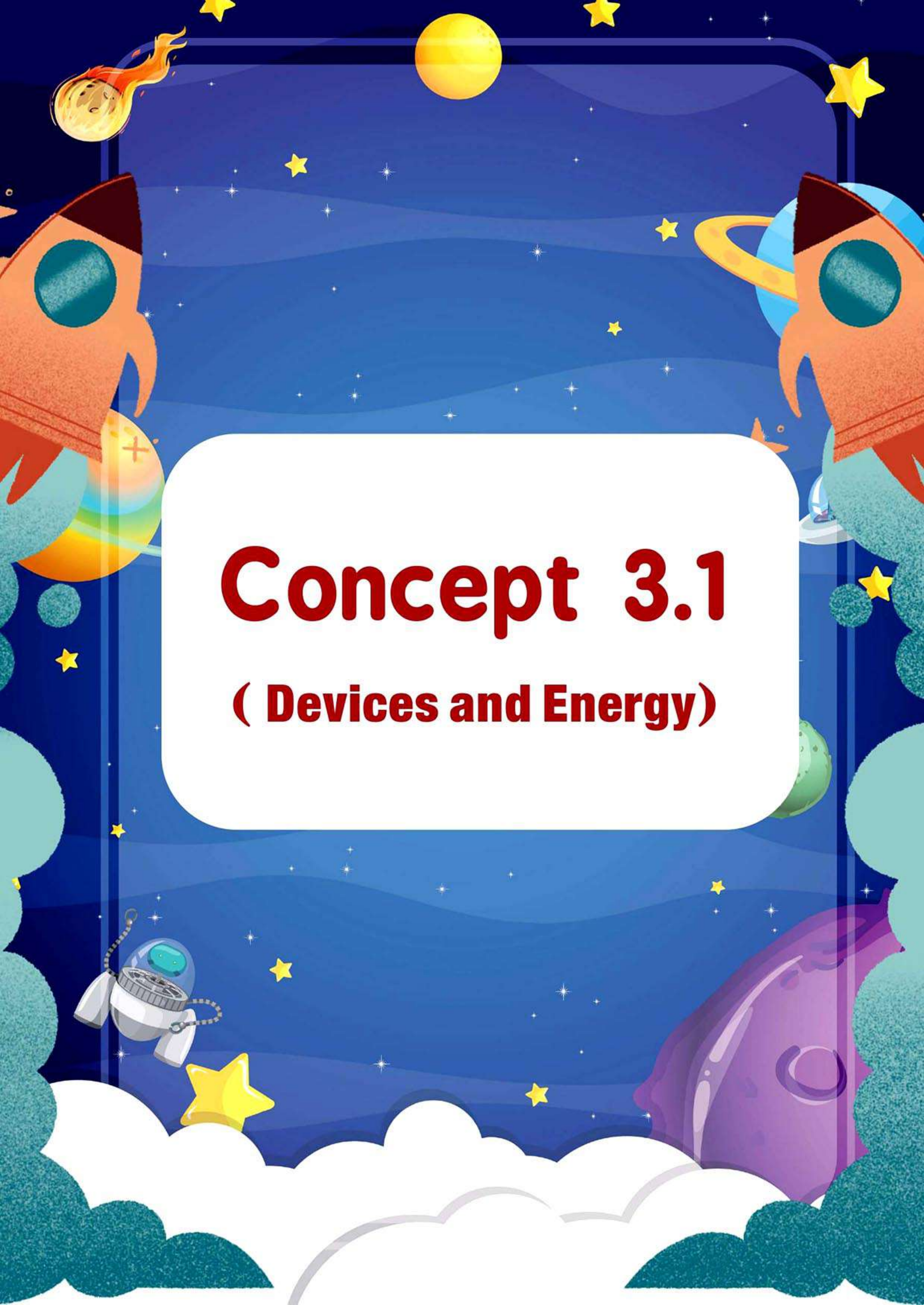
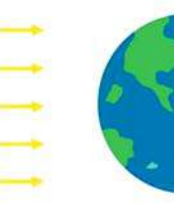


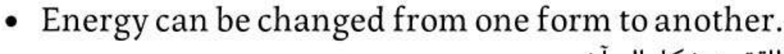
The Top
SCIENCE
Grade 4
Mr . Salah Khalil
01011505935


Concept 3.1
(Devices and Energy)

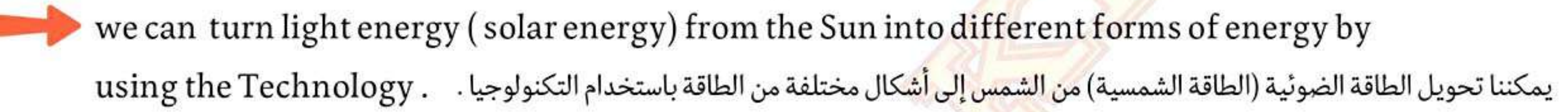




- Energy can be changed from one form to another.
  يمكن تغيير الطاقة من شكل إلى آخر.
- Most of the energy we use every day comes from **the Sun**.
  معظم الطاقة التي نستخدمها كل يوم تأتي من الشمس.
- Most devices in our houses need electricity.
  تحتاج معظم الأجهزة في منازلنا إلى الكهرباء.
- Solar energy is a clean source of energy.
  الطاقة الشمسية هي مصدر نظيف للطاقة.



➡ we can turn light energy (solar energy) from the Sun into different forms of energy by using the Technology . يمكننا تحويل الطاقة الضوئية (الطاقة الشمسية) من الشمس إلى أشكال مختلفة من الطاقة باستخدام التكنولوجيا .



Solar cells
الخلايا الشمسية

➡ Solar cells can convert solar energy into electrical energy to operate many devices, such as calculators and mobile phones.
يمكن للخلايا الشمسية تحويل الطاقة الشمسية إلى طاقة كهربائية
لتشغيل العديد من الأجهزة ، مثل الآلات الحاسبة والهواتف المحمولة.





Energy in Remote-Controlled Cars
الطاقة في السيارات التي يتم التحكم فيها عن بعد

➡ Toy cars or other toys contain batteries that allow us to control them **remotely** from a distance تحتوي سيارات الألعاب أو الألعاب الأخرى على بطاريات تسمح لنا بالتحكم فيها عن بعد من مسافة بعيدة



Cars | Trucks | Planes | Boats








All of these toys need energy and use electricity to move and do tasks
كل هذه الألعاب تحتاج إلى الطاقة وتستخدم الكهرباء للتحرك والقيام بالمهام



How do these toys get energy

كيف تحصل هذه الألعاب على الطاقة

- Toys need a source of energy to operate, such as batteries.
  تحتاج الألعاب إلى مصدر للطاقة لتشغيلها ، مثل البطاريات.
- Batteries store chemical energy inside them.
  تخزن البطاريات الطاقة الكيميائية بداخلها.

When toys are operated;

عندما يتم تشغيل اللعب;

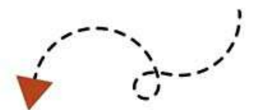
chemical energy (stored in battery) → changes into → electrical energy → changes into → kinetic energy and sound energy







Batteries can be





1 - Recharged إعادة الشحن

By plugging the device into the nearest charger.

عن طريق توصيل الجهاز بأقرب شاحن.

2- Replaced استبدال



With new ones from a store.

مع جديدة من متجر.



If the battery runs out, we have to replace it with a new one or recharge it into a nearby charger.

في حالة نفاد البطارية ، يتعين علينا استبدالها بأخرى جديدة أو إعادة شحنها في شاحن قريب.





Mars Rover

Mars Rover Curiosity : A robotic vehicle designed to explore the surface of Mars.
مركبة روبوتية مصممة لاستكشاف سطح المريخ.



- In the past few years, humans have sent many missions to Mars using robots and vehicles operated remotely and none of these missions included people.
في السنوات القليلة الماضية ، أرسل البشر العديد من المهام إلى المريخ باستخدام الروبوتات والمركبات التي تعمل عن بعد ولم تشمل أي من هذه المهام أشخاصا.
  - A spacecraft takes six months or more to reach Mars.
  تستغرق المركبة الفضائية ستة أشهر أو أكثر للوصول إلى المريخ.
  - The distance between Earth and Mars is about 54 million kilometers.
  المسافة بين الأرض والمريخ حوالي 54 مليون كيلومتر.
  - One of the most famous robots on Mars is the Curiosity Rover

these rovers need energy

The batteries used in the toys cannot be used in these robots. Because robots on Mars are too far from local stores or sockets (plugs) on Earth.
لا يمكن استخدام البطاريات المستخدمة في الألعاب في هذه الروبوتات. لأن الروبوتات على المريخ بعيدة جدا عن المتاجر المحلية أو المقابس (المقابس) على الأرض.

How does Curiosity Rover get energy

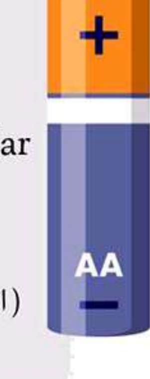
Curiosity Rover Uses

Solar Energy



Solar panels on the rover convert solar energy into electrical energy to charge the rover's batteries.
تقوم الألواح الشمسية الموجودة على العربة الجوالة بتحويل الطاقة الشمسية إلى طاقة كهربائية لشحن بطاريات العربة الجوالة.

batteries



(which are charged by solar energy)
(التي يتم شحنها بواسطة الطاقة الشمسية)

Electrical energy from the batteries powers the rover's sensors, and electrical energy is converted into thermal and kinetic energies as the rover moves and explores Mars.
تعمل الطاقة الكهربائية من البطاريات على تشغيل مستشعرات العربة الجوالة ، ويتم تحويل الطاقة الكهربائية إلى طاقات حرارية وحركية أثناء تحرك العربة الجوالة واستكشافها للمريخ.

scientific term

	Term	Definition
1	Mars Rover curiosity	A robotic vehicle that is used to explore the surface of Mars
2	cehmical energy	the form of energy that is stored in the battery
3	battery	The source of energy in some toys that stores chemical energy.
4	electrical energy	The energy produced from batteries.
5	solar panels	A tool on Mars rover that enable it to get energy

Give reason

1. **Aremote-controlled toy car needs a battery to move from one place to another.**
   Because the chemical energy stored in the battery is converted into electrical energy that changes intokinetic energy that makes the car move.
2. **Some calculators use the sunlight to operate.**
   Because the energy of sunlight (solar energy) is converted into electrical energy which calculators use to be operated.
3. **Mars rover Curiosity operates for a long period of time on Mars without any need to be recharged.** Due to the presence of solar panels that use sunlight to recharge its batteries.

What happens if

4. **the battery of a drone is exhausted**
   the drone cannot be operated
5. **Mars rover 's batteries were not recharged**
   the mars rover cannot be operated and can't explore Mars



words of the lesson

English	Arabic
devices	الأجهزة
generate	توليد
operate	تعمل
energy	الطاقة
transformations	التحولات
recharge	إعادة الشحن
remote control	جهاز التحكم عن بعد
robot	روبوت
resource	الموارد
chemical energy	الطاقة الكيميائية
kinetic energy	الطاقة الحركية
run out	نفد
perform	أداء
batteries	بطاريات
Mars	المريخ
exploration	الاستكشاف
distance	المسافة
spacecraft	المركبة الفضائية
missions	البعثات
solar panels	الألواح الشمسية
sensors	أجهزة الاستشعار
convert	تحويل
designed	تصميم
electric mixer	خلاط كهربائي
without	بدون



Exercises on Lesson 1

Choose the correct answer:

1. Energy can be ……………..from one form to another.
   - a changed
   - B destroyed
   - C created
   - D b and c
2. Most toys depend on…………..as a source of energy.
   - a water
   - B batteries
   - C fuel
   - D food
3. ………………toys can be operated remotely from a distance.
   - a Car
   - B Plane
   - C Boat
   - D All the previous
4. Batteries store ………………. energy inside them.
   - a chemical
   - B electrical
   - C solar
   - D kinetic
5. Batteries can be ……………by electricity.
   - a changed
   - B charged
   - C replaced
   - D converted
6. In a battery of a toy car,…………………energy is changed into electrical energy.
   - a thermal
   - B chemical
   - C sound
   - D light
7. Curiosity Rover is designed to explore ……………..
   - a the Sun
   - B the moon
   - C Mars
   - D Earth
8. The distance between Earth and Mars is about ……………million km.
   - a 45
   - B 55
   - C 54
   - D 540
9. We can convert the solar energy into ………………..energy inside the solar panels.
   - a kinetic
   - B thermal
   - C electrical
   - D sound
10. Which of the following is considered energy?
    - a Air
    - B Fuel
    - C Water
    - D Electricity
11. Both toy cars and Curiosity Rover
    - a use solar energy
    - B explore Mars
    - C are controlled remotely
    - D use the same batteries

Put (✓) or (✗):

1. Energy cannot be transformed from one form to another. ( )
2. We can convert the solar energy into different forms of energy. ( )
3. A toy car can continue moving even after its battery runs out. ( )
4. Curiosity is a vehicle that travels across the surface of the planet Mars. ( )

5. Mars is located a few meters away from Earth. ( )
6. Mars rover Curiosity cannot move without electrical energy. ( )

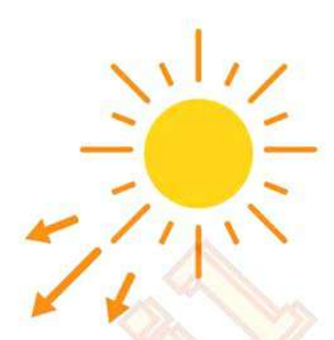
Correct the underlined words :

1. The solar energy produced from the moon can be converted into different forms of energy. ( )
2. Toy cars depend on fuel as a source of electrical energy. ( )
3. Curiosity is a robotic vehicle that is designed to explore the surface of moon. ( )

Complete the following sentences :

1. The energy can be .... from one form to another.
2. Remote controlled toy car converts .... energy stored in its batteries into .... energy that is converted into .... energy which is used to move the car.
3. To operate an electric mixer we use .... energy.
4. When your cell phone is out of charge, you must recharge its ....to operate it again.
5. Some calculators can change solar energy into.................. energy by using the sunlight.
6. On planet Mars, Curiosity robot is operated by using .... energy from sunlight that is converted into .... energy used to recharge its batteries.

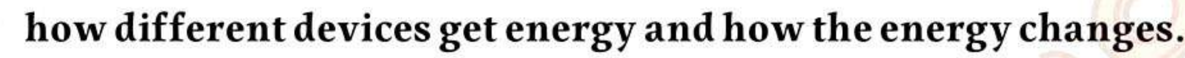






Remember

- The Sun is considered the main source of energy for all devices we use.
- تعتبر الشمس المصدر الرئيسي للطاقة لجميع الأجهزة التي نستخدمها.
- Energy chains show the path of energy from the Sun to different devices.
- تظهر سلاسل الطاقة مسار الطاقة من الشمس إلى الأجهزة المختلفة.

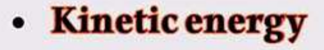


how different devices get energy and how the energy changes.

كيف تحصل الأجهزة المختلفة على الطاقة وكيف تتغير الطاقة.

Input energy : it is the energy consumed in the device. إنها الطاقة المستهلكة في الجهاز.

Output energy : it is the energy produced from the device. إنها الطاقة المنتجة من الجهاز.

Consumed Energy (Input Energy)	Device	Produced Energy (Output Energy)
Electrical energy	 Washing machine غسالة ملابس	 • Kinetic energy • Sound energy
Electrical energy	 Hair dryer مجفف شعر	 • Thermal energy • Sound energy • Kinetic energy
Potential energy (stored in the spring of the soap dispenser)	 Soap dispenser	Kinetic energy (movement of the soap)



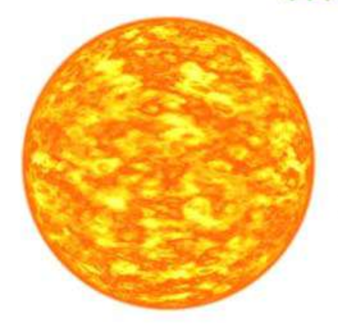
Energy chains:

سلاسل الطاقة

- Energy chain is a way to describe the energy flow that occurs when we use different devices.
  سلسلة الطاقة هي طريقة لوصف تدفق الطاقة الذي يحدث عندما نستخدم أجهزة مختلفة.
- Energy chains often start with the Sun.
  غالبا ما تبدأ سلاسل الطاقة بالشمس.

Energy chain when eating food, such as an orange

سلسلة الطاقة عند تناول الطعام ، مثل البرتقال



The Sun produces energy that reaches the Earth in the form of light and heat.
تنتج الشمس طاقة تصل إلى الأرض على شكل ضوء وحرارة.





The green plant converts the light energy of the Sun into chemical energy stored in the form of sugars inside the orange tree.
يحول النبات الأخضر الطاقة الضوئية للشمس إلى طاقة كيميائية مخزنة على شكل سكريات داخل شجرة البرتقال.





When you eat an orange, your body stores chemical energy and converts it into kinetic energy when you move.
عندما تأكل برتقالة ، يخزن جسمك الطاقة الكيميائية ويحولها إلى طاقة حركية عندما تتحرك.

Light energy (from the Sun)

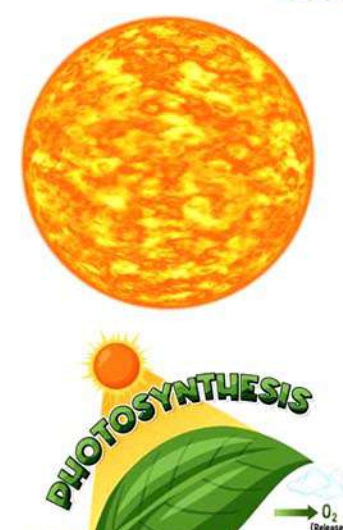


chemical energy (stored inside the plant then inside your body)



kinetic energy (to do different activities)

Energy chain when heating a pot of water over a fire
سلسلة الطاقة عند تسخين وعاء من الماء على النار



Light energy that comes from the Sun causes the growth of trees. الطاقة الضوئية التي تأتي من الشمس تسبب نمو الأشجار.



This plant converts the light energy of the Sun into chemical energy, which is stored inside the tree in the form of sugars.
يحول هذا النبات الطاقة الضوئية للشمس إلى طاقة كيميائية ، يتم تخزينها داخل الشجرة على شكل سكريات.





When the wood of the trees is burned, thermal energy is released, which heats the water inside the pot.
عندما يتم حرق خشب الأشجار ، يتم إطلاق الطاقة الحرارية ، والتي تسخن الماء داخل الوعاء.

Light energy (from the Sun)



chemical energy (stored inside the tree)



thermal energy (when burning the wood of trees to heat water inside the pot)

Energy chain in a hair dryer
سلسلة الطاقة في مجفف الشعر



Light energy that comes from the Sun causes the growth of trees.
الطاقة الضوئية التي تأتي من الشمس تسبب نمو الأشجار.

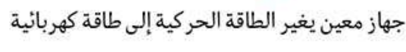


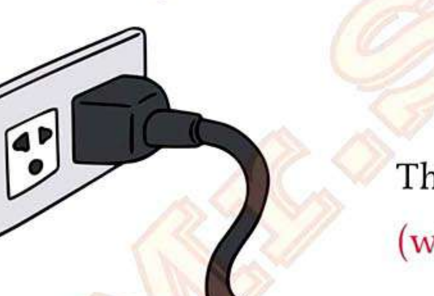
- Coal is produced from the remains of dead trees that died millions of years ago. يتم إنتاج الفحم من بقايا الأشجار الميتة التي ماتت منذ ملايين السنين.
- Coal is a source of energy that stores chemical energy
  الفحم مصدر للطاقة يخزن الطاقة الكيميائية



In the electric power station: في محطة الطاقة الكهربائية:

- Coal is burned to produce thermal energy. يتم حرق الفحم لإنتاج الطاقة الحرارية.
- Thermal energy is converted into kinetic energy.
  يتم تحويل الطاقة الحرارية إلى طاقة حركية.
- A certain device changes kinetic energy into electrical energy


جهاز معين يغير الطاقة الحركية إلى طاقة كهربائية



The electrical energy reaches the hair dryer through an electric cord (wire) made of copper.
تصل الطاقة الكهربائية إلى مجفف الشعر من خلال سلك كهربائي (سلك) مصنوع من النحاس.



When the hair dryer is operated, electrical energy changes into:

-Thermal energy. - Kinetic energy. - Sound energy.

عندما يتم تشغيل مجفف الشعر ، تتغير الطاقة الكهربائية إلى:
- الطاقة الحرارية. - الطاقة الحركية. - طاقة الصوت.



Light energy
(from the Sun)





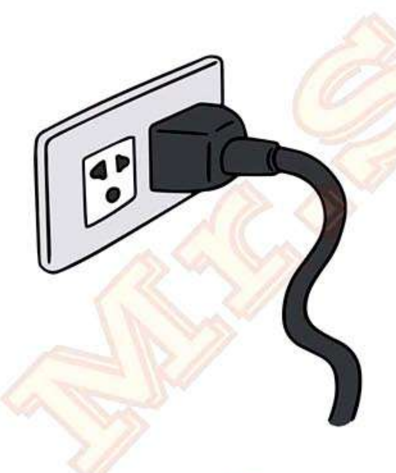
chemical energy
(stored inside coal)





thermal energy
(when burning the Coal, Inside a power plant)





electrical energy
(goes through the electric wires)





-Thermal energy - Sound energy
- Kinetic energy
(in the hair dryer)







NOTES

1. Not all the energy in an energy chain reaches the device.
2. Some of the energy is wasted while travelling through the energy chain, as it is converted into other forms of energy. This is because energy is not destroyed but it is converted into other forms of energy that the device does not use.
3. Most of the **wasted energy** leaks out in the form of **heat**.

1- لا تصل كل الطاقة في سلسلة الطاقة إلى الجهاز.

2- يتم إهدار بعض الطاقة أثناء السفر عبر سلسلة الطاقة ، حيث يتم تحويلها إلى أشكال أخرى من الطاقة. وذلك لأن الطاقة لا يتم تدميرها ولكن يتم تحويلها إلى أشكال أخرى من الطاقة لا يستخدمها الجهاز.

3- تتسرب معظم الطاقة المهدرة على شكل حرارة.

scientific term

	Term	Definition
1	The Sun	The main source of energy for most forms of energies on Earth.
2	Thermal energy	The energy produced when the wood of trees is burned.
3	Chemical energy	• The form of energy that is stored in the battery of a remote control. • The energy stored in plants in the form of sugar. • The energy stored in coal.
4	electrical energy	The energy produced from batteries.
5	coal	The substance that is produced from the remains of dead trees that buried deep in the Earth over millions of years.
6	spring	A part of the soap dispenser that stores potential energy that is changed into kinetic energy
7	energy chain	A path that shows the energy flow from its source to the device.

Give reason

1. **There is an energy change when you press the spring of a soap dispenser.**
   Because the potential energy stored in its spring is converted into kinetic energy that moves the soap upward.

2. **When you rub your hands together, you feel warm.**
   Because the kinetic energy is converted into thermal energy.

3. **The Sun Is considered the main source of energy for all devices.**
   because all energy chains start with the sun

words of the lesson

English	Arabic
remains	بقايا
waste	النفايات
buried	دفن
coal	الفحم
energy chain	سلسلة الطاقة
transmitted	المنقولة
emit	تنبعث منها
rub	فرك
consumed energy	الطاقة المستهلكة
produced energy	الطاقة المنتجة
blender	خلاط
together.	معا
converted into	تحويلها إلى
depend on	تعتمد على
transform	تحويل
electric wires	الأسلاك الكهربائية
transferred	نقل



Exercises on Lesson 2

Choose the correct answer:

1. The input energy is the energy .... devices.
   - a) destroyed in
   - B) consumed by
   - C) produced from
   - D) resulted from
2. .... is considered the main source of energy on the Earth's surface.
   - a) Fuel
   - B) The moon
   - C) TheSun
   - D) A battery
3. we can use .... to produce thermal energy in power stations.
   - a) the moon
   - B) glass
   - C) the Sun
   - D) coal
4. Some energy is lost in most devices in the form of .... energy.
   - a) electrical
   - B) thermal
   - C) sound
   - D) kinetic
5. Electric wires are made up of .... material.
   - a) plastic
   - B) wood
   - C) iron
   - D) copper
6. The input energy in Curiosity Rover is .... energy.
   - a) thermal
   - B) solar
   - C) electrical
   - D) kinetic
7. Which form of energy is not used or produced in a hair dryer?
   - a) Sound energy
   - B) Thermal energy
   - C) Light energy
   - D) Electrical energy
8. .... energy is consumed while burning wood.
   - a) Thermal
   - B) Chemical
   - C) Kinetic
   - D) Light
9. All of these energies are produced from the hairdryer, except the.............energy.
   - a) sound
   - B) thermal
   - C) kinetic
   - D) electrical
10. All of the following store chemical energy, except ....
    - a) a battery
    - B) an apple
    - C) a compressed spring
    - D) coal

Put (✓) or (✗):

1. In the soap dispenser, potential energy is converted into kinetic energy. ( )
2. In the electric blender, sound energy is converted into electrical energy and kinetic energy. ( )
3. Most of energy chains starts with the energy of the moon. (Giza 2023) ( )
4. Light energy from the Sun helps trees to grow. ( )
5. Both the hair dryer and the washing machine depend on the same kind of energy to operate. ( )



6. In electric power stations, sound energy produced from burning of coal is converted into electrical energy. ( )
7. There is energy waste when energy is transformed from one form to another. ( )
8. Energy can be destroyed inside some devices. ( )

Complete the following sentences :

1. The energy produced from the battery and used to operate a toy car is............. energy.
2. When you press on the soap dispenser................ energy stored in its spring is converted into .... energy that moves the soap upward.
3. The energies that are produced from the washing machine are .... energy and .... energy.
4. When you rub your hands together, the .... energy is converted into ....energy.
5. In any energy chain, some of the energy is wasted in the form of ....

Energy and Everyday Devices

Device	Function	input energy	output energy
Electric bulb	Lighting	Electrical energy	Light energy Thermal energy,
TV	Display sound and image	Electrical energy	Light energy Sound energy
Electric iron	Ironing clothes	Electrical energy	Thermal energy
Electric heater	Warming	Electrical energy	Thermal energy
Electric bell	Alerting	Electrical energy	Sound energy



Device	Function	input energy	output energy
Hand bell	Alerting	Kinetic energy	Sound energy
Guitar	Playing music	Kinetic energy	Sound energy
Toy car (it is operated by spring)	Toys for kids	Potential energy (stored in a spring)	Kinetic energy
Toy car (it is operated by a battery)	Toys for kids	Chemical energy (stored in a battery)	Kinetic energy
Watch	Knowing time	Chemical energy (stored in a battery)	Kinetic energy



- **from the previous we conclude** مما سبق نستنتج

1. Any device needs a source of energy to operate. يحتاج أي جهاز إلى مصدر للطاقة ليعمل.
2. Energy can be changed from one form to another. يمكن أن تتحول الطاقة من شكل إلى آخر.
3. Some of the input energy escapes in other forms that the devices don't use to perform their functions. تتسرب بعض الطاقة المدخلة بأشكال أخرى لا تستخدمها الأجهزة لأداء وظائفها.

The Conservation of Energy
الحفاظ على الطاقة

- In the previous lesson, we learned that energy can be transformed easily from one form to another.
- Now, let's study some examples of energy transformation.

Energy chain while riding a bike
سلسلة الطاقة أثناء ركوب الدراجة



- When you eat your breakfast, the chemical energy stored in the food provides your body with energy.
  عندما تتناول وجبة الإفطار، فإن الطاقة الكيميائية المخزنة في الطعام تزود جسمك بالطاقة.



- When you push pedals, chemical energy is converted into kinetic energy , which moves the bike.
  عندما تضغط على الدواسات، تتحول الطاقة الكيميائية إلى طاقة حركية، والتي تحرك الدراجة.



- A part of the kinetic energy changes to thermal energy due to the friction between the wheels of the bike and the road.
  يتغير جزء من الطاقة الحركية إلى طاقة حرارية نتيجة الاحتكاك بين عجلات الدراجة والطريق.

Energy chain in the light bulb
سلسلة الطاقة في المصباح الكهربائي

- When you turn on a light bulb, the electrical energy that powers the light bulb.
- عندما تقوم بتشغيل المصباح الكهربائي، فإن الطاقة الكهربائية هي التي تزود المصباح الكهربائي بالطاقة.



converted into

- Light energy, so the room becomes brighter
- Thermal energy, so you feel the heat when you approach your hand near the light bulb.
- الطاقة الضوئية، وبالتالي تصبح الغرفة أكثر إشراقا
- الطاقة الحرارية، فتشعر بالحرارة عندما تقترب يدك من المصباح الكهربائي.

From the previous:

- The new energy cannot be created from nothing. لا يمكن إنشاء الطاقة الجديدة من لا شيء.
- The old energy does not disappear, but it changes from one form into another. الطاقة القديمة لا تختفي، بل تتغير من شكل إلى آخر.
- This is called" The Law of Conservation of Energy". وهذا ما يسمى "قانون الحفاظ على الطاقة".

law of conservation of energy
قانون حفظ الطاقة

Energy is neither created nor destroyed it can only be converted from one form to another

الطاقة لا تفنى ولا تدمر بل يمكن أن تتحول فقط من شكل إلى آخر



scientific term

1. **Light energy.** — A form of energy produced from the electric lamp and affects Our eyes.
2. **The law of conservation of energy.** — Energy can neither be created nor destroyed, but only converted from one form into another.
3. **thermal energy** — The lost energy on using a computer.
4. **Copper** — The material that electric wires are made from.
5. **sound energy** — The energy produced from playing the guitar.

Give reason

1. **You feel heat, when you put your hands near a lighted electric lamp.**
   Because some of the electrical energy is converted into thermal energy.
2. **The presence of batteries inside a toy car.**
   Because battery is the source of energy where the chemical energy is converted into electrical energy to operate the toy car.

What happens if

3. **You put your hands near the lighted lamp.**
   You feel warm, because some electrical energy is converted into thermal energy.
4. **You shake a small bell with your hand. (according to the change of energy)**
   The kinetic energy is converted into sound energy



words of the lesson

conservation of energy	الحفاظ على الطاقة
friction	احتكاك
mechanical energy	الطاقة الميكانيكية
wires	الأسلاك
disappear	يختفي
switch on	شغل / مفتوح
destroy	هدم / تدمير
pedals	الدواسات
produced	أنتجت
flashlight	مصباح يدوي
depends on	يعتمد على
operate	العمل
proves	يثبت
according to	وفقا لي / بالنسبه لي



Exercises on Lesson 3

Choose the correct answer:

1. The input energy in the fridge is .... nergy
   - a. light
   - B. electrical
   - C. sound
   - D. kinetic
2. All the following devices produce thermal energy, except the ....
   - a. hairdryer
   - B. watch
   - C. kettle
   - D. electric heater
3. Sound energy is produced from all the following devices, except the.............
   - a. washing machine
   - B. hairdryer
   - C. mobile phone
   - D. electric iron
4. The .... uses the thermal energy to do its function.
   - a. mobile phone
   - B. washing machine
   - C. TV
   - D. hair dryer
5. the .... changes electrical energy into light and sound energies.
   - a. washing machine
   - B. TV
   - C. radio
   - D. hair dryer
6. The produced .... energy doesn't help the blender do its job.
   - a. sound
   - B. kinetic
   - C. chemical
   - D. potential
7. in all of these devices, kinetic energy is converted into sound energy, except the ....
   - a. guitar
   - B. electric bell
   - C. hand bell
   - D. drum
8. When you turn on your television, the electrical energy travels through ....until it reaches it.
   - a. wires
   - B. air
   - C. screens
   - D. plastics
9. During riding a bike, some kinetic energy is converted into Roc energy due to the friction of the bike's tire with the road.
   - a. chemical
   - B. potential
   - C. thermal
   - D. electrical
10. During playing football, the chemical energy inside the body is converted into .... energy.
    - a. ight
    - B. kinetic
    - C. potential
    - D. electrical

Put (✓) or (✗):

1. There is a stored chemical energy inside the food we eat. ( )
2. As a result of friction between bike's tires and the road, kinetic energy is converted into chemical energy. ( )
3. When pedalling a bike, the chemical energy in your body is converted into kinetic energy. ( )
4. Energy can't be changed from one form to another. ( )

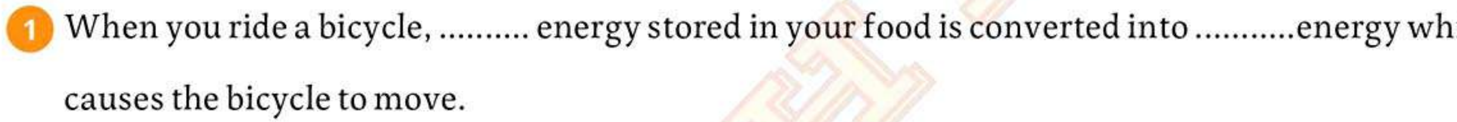
5. The electric bulb depends on chemical energy to operate. ( )
6. Both the electric bulb and the electric heater produce thermal energy. ( )

Cross out the odd word:

1. Food - Battery - Lamp - Coal ( )
2. TV - Mobile phone - Radio - Computer ( )
3. Hairdryer - Blender - Washing machine - Light bulb ( )

Complete the following sentences :

1. When you ride a bicycle, ... energy stored in your food is converted into ....energy which causes the bicycle to move.



2. Some kinetic energy of the bicycle is converted into .... energy due to the friction of its tires with the road.
3. The electric lamp converts .... energy into light energy and .... energy.
4. The change of electrical energy into sound energy in the radio is an example that proves the law of ....
5. Energy can neither be ....nor .... , but only .... from one form to another.
6. The electric lamp converts electrical energy into .... energy and .... energy.



- **Energy is conserved. It is neither created nor destroyed.** يتم الحفاظ على الطاقة. لا يتم خلقها ولا تدميرها.
- **All the energy that goes into a device must eventually leave it in a different form.**
  كل الطاقة التي تدخل إلى الجهاز يجب أن تتركه في النهاية في شكل مختلف
- **The energy that goes in the device is called "input energy".**
  تسمى الطاقة التي تدخل الجهاز "طاقة الإدخال".
- **The energy that comes out the device is called "Output energy".**
  الطاقة التي تخرج من الجهاز تسمى "الطاقة الناتجة".

Hair Dryer

مجفف شعر



Function: Drying hair

تجفيف الشعر

Input energy	Output energy
Electrical energy (moves through the wire) طاقة كهربائية (التي تتحرك عبر السلك)	Thermal energy (to dry hair) Sound energy (noise) Kinetic energy (fan movement and air flow) الطاقة الحركية (حركة المروحة وتدفق الهواء)

- **Noise from a hair dryer seems like "lost energy .**

الضجيج الصادر عن مجفف الشعر يبدو وكأنه "طاقة مفقودة".

Because sound energy doesn't help the hair dryer do its main function.

لأن الطاقة الصوتية لا تساعد مجفف الشعر على القيام بوظيفته الرئيسية.



Mobile Phone





Function: light up - ring - process information

تضيء - الرن - معالجه المعلومات

Input energy



electrical energy
(when charging the phone)
طاقة كهربائية (عند شحن الهاتف)

electrical energy is stored in battery in a form of chemical energy.
يتم تخزين الطاقة الكهربائية في البطارية على شكل الطاقة الكيميائية.

Output energy



light energy and sound energy
الطاقة الضوئية والطاقة الصوتية

- **When using a mobile phone for a long time , some energy is lost**

عند استخدام الهاتف المحمول لفترة طويلة، يتم فقدان بعض الطاقة

because thermal energy is produced and it does not help the mobile phone do its main function

لأن الطاقة الحرارية التي تنتج لا تساعد الهاتف المحمول على القيام بوظيفته الأساسية .

Energy chain during playing football

سلسلة الطاقة أثناء لعب كرة القدم

Light energy (the Sun)

Chemical energy (stored in the tree)



Chemical energy (stored in the food)



Cnemical energy (stored in the body)



Kinetic energy (playing football)



scientific term

1. **Chemical energy** — The energy that is stored in both batteries and food.
2. **Electrical energy** — The energy that is produced from the electric power stations and flows through wires.
3. **Thermal energy** — Aform of energy that is produced from the electric heater and burning coal.
4. **Kinetic energy** — The energy that is produced from the blender and helps it do its job
5. **Thermal energy** — The wasted energy when using a mobile phone for a long time

Give reason

1. **thermal energy produced from electric heater isn't lost energy**
   because it helps the electric heater do its functions
2. **The electrical energy that enters the hair dryer does not come out of the hair dryer in the same form of energy.**
   Because it is converted into kinetic, thermal and sound energies.

What happens if

3. **You turn on an electric fan.**
   The electrical energy is converted into kinetic energy which do the main function of fan and sound energy as wasted energy.



words of the lesson

wasted energy	الطاقة الضائعة / المهدره / المفقوده
path of energy	طريق الطاقة
enters	يدخل
processing information	معالجة المعلومات
illuminate	تضيء
function	وظيفة
noise	ضوضاء
Blender	الخلاط
produced.	أنتجت.
different	مختلف
devices	الأجهزة
inside	داخل
outside	خارج



Exercises on Lesson 4

Choose the correct answer:

1. The input energy when using the hair dryer is the .... energy.
   - a) electrical B) potential C) kinetic D) thermal
2. Which form of energy is not an output energy when a hair dryer is used ? ....
   - a) Kinetic energy. B) Electrical energy. C) Thermal energy. D) Sound energy.
3. During charging a mobile phone, the .... energy is converted into .... energy that is stored in the phone battery.
   - a) electrical — chemical B) chemical — thermal
   - C) electrical — thermal D) thermal — chemical
4. Sound anid .... energies are output energies when operating the mobile phone.
   - a) electrical B) potential C) chemical D) light
5. The output energy when playing drums is the .... energy.
   - a) chemical B) light C) sound D) potential
6. The produced .... energy does not help the blender do its job.
   - a) chemical B) sound C) light D) potential
7. When a piece of coal is burned, ... energy is produced.
   - a) thermal B) solar C) sound D) potential
8. When a football player runs, the chemical energy inside his body is converted Into...................... and................... energies.
   - a) potential — light B) kinetic — light
   - C) thermal — kinetic D) thermal — light

Put (✓) or (✗):

1. Energy may be destroyed inside different devices. ( )
2. Some of the converted energy does not help some devices do the function for which it was designed. ( )
3. The produced sound energy helps the hair dryer to do its function. ( )
4. The input energy in a hair dryer is the chemical energy. ( )

5. the amount of energy equal the sum of the energies produced from it ( )
6. the amount of electric energy used to charge a mobile phone is graeter than the produced light energy ( )

Complete the following sentences :

1. The mobile phone converts chemical energy stored in its battery into electrical energy that is converted into .... energy and .... energy which are help it to do its function.
2. By using the mobile phone for a long time, some energy is lost in the form of................energy.
3. The input energy of a hair dryer is .... energy, while the output energies of a hair dryer are .... energy and ....energy and ....energy.
4. The wasted energies that are produced from a vacuum cleaner are .... energy and .... energy.
5. The main function of a blender is done by the help of the produced ....energy.
6. The input energy in an electric bulb is ....energy, while its output energies are .... energy and also .... energy which doesn't help in its main function.
7. The input energy when recharging a mobile phone is .... energy which is stored in the form of................. energy inside the phone battery.
8. In the electric heater, ... energy is considered as an input energy, while thermal energy is considered as .... energy.


Concept 3.2
(About fuel)

Humans use Many forms of fuel in their daily lives such as:



Gasoline



used in moving cars.

Natural gas



used in cooking.

Coal



used in warming.

Fuel : A substance that produces thermal energy when it is burned.

مادة تنتج طاقة حرارية عند احتراقها.

We use fuels in many purposes such as : نستخدم الوقود في العديد من الأغراض مثل:

- Warming our houses. تدفئة منازلنا.
- Supply cars with energy to move. تزويد السيارات بالطاقة اللازمة للتحرك.

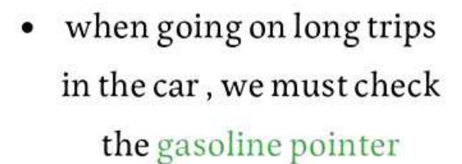
- Fuel stores chemical energy inside it يخزن الوقود الطاقة الكيميائية بداخله
- Fuel is used as a source of thermal energy when It is burned. يستخدم الوقود كمصدر للطاقة الحرارية عند احتراقه.
- Gasoline is made up of oil. يتكون البنزين من النفط.
- Oil , coal and natural gas are extracted from the underground يتم استخراج النفط والفحم والغاز الطبيعي من باطن الأرض
- Fuel is burned in electric power stations to generate electricity, يتم حرق الوقود في محطات الطاقة الكهربائية لتوليد الكهرباء،



If the fuel runs out, the car will stop moving.

وفي حالة نفاد الوقود، ستتوقف السيارة عن الحركة.





- if you notice a drop in the gasoline pointer , you should go to the nearest gas station

إذا لاحظت انخفاضاً في مؤشر البنزين عليك التوجه إلى أقرب محطة وقود

- when going on long trips in the car , we must check the gasoline pointer

عند القيام برحلات طويلة في السيارة يجب فحص مؤشر البنزين





How car is operated

كيف يتم تشغيل السيارة



1- Gasoline burns inside the car's engine produce thermal energy

1- احتراق البنزين داخل محرك السيارة ينتج طاقة حرارية

2- the car's engine rotates the wheels of car (kinetc energy)

2- يقوم محرك السيارة بتدوير عجلات السيارة (الطاقة الحركية)

Uses of some types of fuel

استخدامات بعض أنواع الوقود



➔ Gasoline or natural gas

- are used in operating all means of transportation.

تستخدم في تشغيل كافة وسائل النقل .

➔ Oil, natural gas, or Coal



- are used in generating electricity.

تستخدم في توليد الكهرباء .

➔ Coal or wood

- are used in warming houses.

تستخدم في تدفئة المنازل.

➔ Coal, natural gas, or wood

- are used in cooking food.

تستخدم في طهي الطعام.







scientific term

	Term	Definition
1	the sun	The main source of most forms of energy on Earth.
2	Gasoline pointer	A device that helps the car driver check the amount of fuel.
3	Gasoline	A liquid fossil fuel that burns inside the car engine.
4	Chemical energy	The kind of energy that is stored in fuel.
5	Thermal energy	A form of energy produced by burning fuel.

Give reason

1. **The fuel is very important for different means of transportation.**
   Because fuel is burned inside the engines to produce thermal energy that is changed into kinetic energy which causes the different means of transportation to move.
2. **Sometimes the fuel indicator of a car goes down.**
   Because the fuel in the car tank runs out.
3. **Gasoline is burned inside a car engine.**
   To produce thermal energy which changes into kinetic energy that causes the car to move.

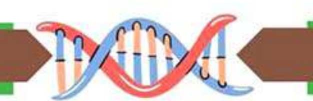
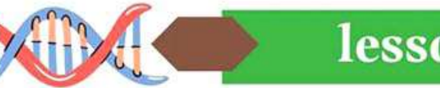
What happens if

4. **The car fuel indicator if the amount of gasoline in a car decreases.**
   The car fuel indicator will go down.
5. **The car movement if fuel runs out in a car.**
   The car movement decreases gradually until it stops.



words of the lesson

run out	نفد	directly	مباشرة
pointer	المؤشر	represents	يمثل
rotate	يدور	fuel indicator	مؤشر الوقود
gasoline	البنزين	fuel tank	خزان الوقود
oil	النفط		
coal	فحم		
natural gas	غاز طبيعي		
fossil fuel	الوقود الحفري		
gas stations	محطات الوقود		
resources	موارد		
conserve	يحفظ		
extract	يستخرج		
purposes	الغرض		
transportation	مواصلات		
gradually	تدريجياً		
car engine	محرك سيارة		
run out.	نفد		
present	حاضر		

Exercises on Lesson 1

Choose the correct answer:

1. all the following are found deeply under the earth's surface , except
   - a) coal   B) oil   C) natural gas   D) green plant
2. .... is considered as the main source of energy on the Earth
   - a) a plant   B) the sun   C) the moon   D) fuel
3. cars need .... to move on the road
   - a) batteries   B) water   C) coal   D) gasoline
4. As fuel burns inside the ...., the wheels of the car rotate
   - a) tires   B) battery   C) engine   D) airbag
5. .... energy is stored inside coal
   - a) thermal   B) solar   C) chemical   D) electrical
6. if we are going on a long trip in the car , we must check the ....
   - a) seats   B) engine   C) speedometer   D) gasoline pointer
7. coal is used in all the following purpose , except ....
   - a) warming houses   B) watching the TV   C) cooking food   D) boiling water
8. .... is / are used in operating all means of transportation
   - a) Gasoline   B) coal   C) natural gas   D) a and c
9. fuel is used as asource of............ energy
   - a) thermal   B) chemical   C) light   D) solar
10. you can burn .... to feel warm in your home in winter
    - a) gasoline   B) coal   C) wood   D) a and c
11. We can use the energy obtained from burning of wood directly for all of the following purposes, except ....
    - a) warming houses.   B) operating television.   C) cooking food.   D) boiling water.

Put (✓) or (✗):

1. As the speed of a car increases, the amount of used fuel decreases. ( )
2. We must check the amount of gasoline in the fuel tank before making a trip by a car. ( )
3. Both coal and wood produce energy when they are burned. ( )
4. Natural gas is a form of fuels that can be used in generating electrical energy. ( )

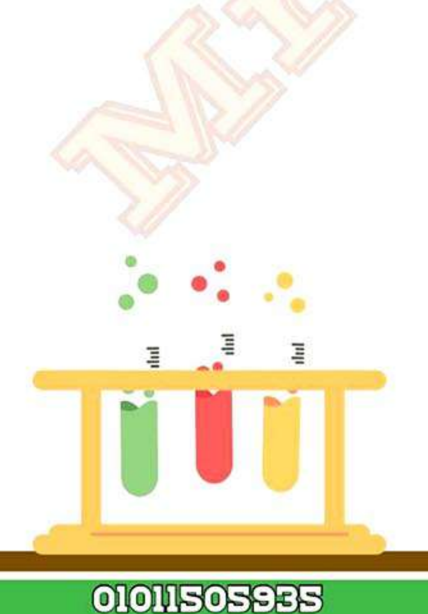
5. water could be used to warm our houses on cold winter days ( )
6. cars , buses , and bicycles need gasoline to run on road ( )

Correct the underlined words :

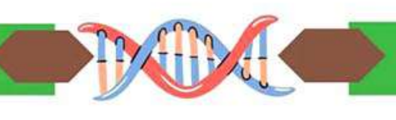
1. We need sound energy, for cooking food and warming houses. ( )
2. Coal is the main source of most energies on the Earth's surface. ( )
3. Fuel is the substance that produces electrical energy on burning. ( )

Complete the following sentences :

1. .... , such as coal and natural gas are found ....
2. when the .... is near to zero , you must go fast to the nearest gas station
3. some forms of fuel , such as .... and .... can be used in warming
4. .... , natural gas , and coal are used in elecrtical power station to generate electricity
5. Some forms of fuel can be used in cooking such as .... , ... and ....
6. Gasoline is burned inside a car engine to produce .... energy that is converted into .... energy which causes the movement of the car.









Remember

Fuel : A substance that produces thermal energy when it is burned.

Nonrenewable resources they are natural resources that are used faster than they be replaced

renewable resources they are natural resources that can be replaced soon after they are used

Types of Fuel

Biofuel



Fossil fuel



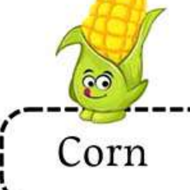
Biofuel: (Renewable resource of energy)



It is the fuel that is made from living things that can be planted.

Examples:









wood | Grass | Corn | Charcoal | liquid fuel

- wood : is the most ancient fuel it is still used all around the world.
- charcoal : is made from wood.
- liquid fuel : is made from grass, corn, and wood chips.



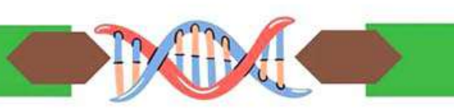
Biofuel Conservation

Using wood as fuel requires cutting down trees.



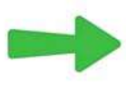
Cutting down trees at a faster rate leads to deforestation

Deforestation has a negative impact on our environment.



- some trees grow a few centimeters every year and reach their full height in more than one person's lifetime.
- **Biofuel** is considered a **renewable source** of energy because it is renewed by the continuous growth of plants

Fossil fuel (Nonrenewable resources of energy)



it is the fuel that was formed from the remains of plants and animals that were buried and decomposed over millions of years ago

Examples:



Coal



Oil



Natural gas

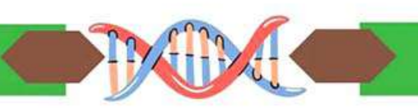


Gasoline

- **Coal is formed from the decomposition of ancient plants remains**
- **Oil and natural gas are formed by the decomposition of the remains of ancient sea animals**
- **Gasoline is fuel that is formed from oil**
- **Fossil fuel are extracted from Underground.**
- **Fossil fuel are formed very slowly over millions of years , which means that we use them faster than they are formed**

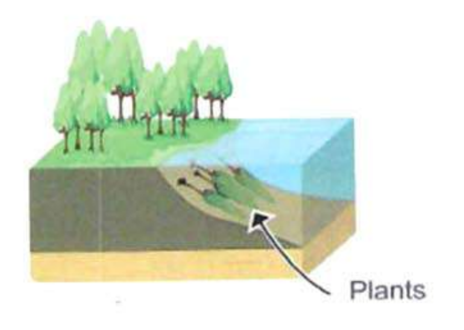
- fossil fuel is considered a nonrenewable source of energy because they are gone and cannot be easily renewed

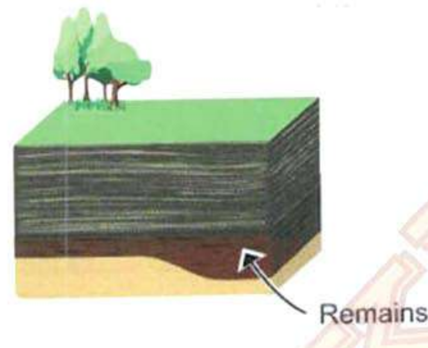


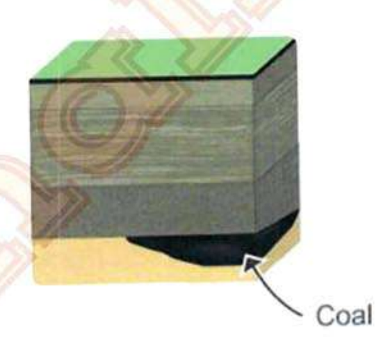


Formation of Coal

1. Over millions of years ago, large areas of Earth were covered with plants and Swamps
2. When these plants died, their remains were covered with hundreds of meters of mud and rocks under the earth's surface
3. Earth's heat and pressure turned these remains **into coal**







Oil and Water

- Oil and water are two types of resources that human can use
- there are some similarities ans differences between Oil and water



Similarities

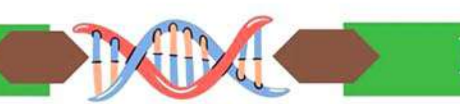
Both oil and water can be used to generate electricity.





Differences

Oil is a nonrenewable resource , while water is a renewable resources



Oil: Nonrenewable resource of energy

- Oil is extracted from underground
- Oil is formed from the decomposition of ancient sea creatures

Formation of Oil

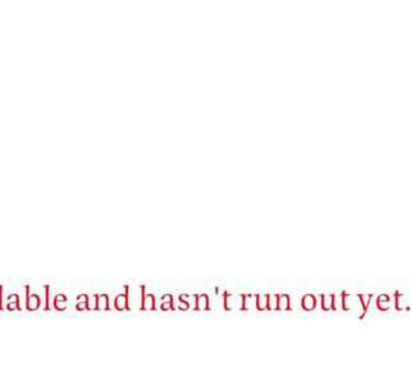
Over many millions of years ago,

- marine organisms died, their remains settled on the sea floor.
- Layers of sediments and rocks cover the remains of the marine organisms.
- Over time, those remains were converted into oil due to extreme heat and pressure.



Water is considered a renewable resource of energy Because water is available and hasn't run out yet.

- Although water is renewable , we must use it carefully and not waste or pollute it
- if we waste or pollute water , it may not be replaced as quickly as we need



How can we conserve these resources

We can conserve oil by:

- Driving less.
- Using public transportation.



We can conserve water by

- Growing plants that don't require a lot of watering.
- Avoid polluting water.

scientific term

	Term	Definition
1	the sun	The main source of energy for most forms of energies on Earth.
2	Fuel	a material that releases thermal energy on burning
3	nonrenewable resources	it is natural resources that is used faster than it can be replaced
4	renewable resources	'it is a natural resource that can be replaced soon after it is used.
5	biofuel	it is the fuel that ls made from living organisms that can be planted
6	fossil fuel	it is the fuel that is extracted from deep ground under the earth's surface
7	Oil	A kind of fossil fuel that is produced from the decomposition of dead marine organisms
8	coal	A fossil fuel that is produced from the decomposition of dead plants.
9	Charcoal	a kind of biofuel that is made from wood of trees
10	liquid fuel	a kind of biofuel that is made from corn and grass
11	Deforestation	A phenomenon that happens by cutting trees at a faster rate to get bio fuel

Give reason

1. **Water and wind are considered as renewable resources of energy**
   Because they can be replaced shortly after being used.

2. **Coal and gasoline are considered as nonrenewable resources of energy.**
   Because they are used at a rate faster than they can be renewed.

3. **Using wood of trees as a fuel has negative effects on the environment.**
   Because continuity of cutting down trees leads to deforestation.

What happens if

4. **People increase using the wood of trees as a source of fuel.**
   It leads to deforestation, which causes negative effects on the environment.

5. **The remains of dead living organisms were buried under the Earth's surface over millions of years.**
   They are converted into fossil fuel.

6. **Decomposition of remains of sea animals under the Earth's surface.**
   They will form oil and natural gas.



words of the lesson

charcoal	فحم
liquid fuel	الوقود السائل
biofuels	الوقود الحيوي
deforestation	إزالة الغابات
negative	سلبي
wood chips	رقائق الخشب
swamps	المستنقعات
nonrenewable	غير متجدد
renewable	قابل للتجديد
pressure	ضغط
remains	بقايا
bury	دفن
ancient	قديم
certain	تأكيد
source	مصدر
original	اصلي
conditions	شروط
sea creatures	مخلوقات البحر
ocean floor	قاع المحيط
press	يضغط
irrigation	الري
sediments	الرواسب
extreme	أقصى
except	يستثني / ماعدا
discovering	اكتشاف
rate of formation	معدل التكوين

Exercises on Lesson 2

Choose the correct answer:

1. .... is considered the main source of energy on the earth's surface
   - a wind
   - B fuel
   - C the sun
   - D water
2. all the following are extracted from underground , except...............
   - a coal
   - B charcoal
   - C petroleum
   - D natural gas
3. ancient people used .... as a form of fuel before discovering gasoline
   - a wind
   - B wood
   - C oil
   - D coal
4. .... is a renewable resource of energy
   - a oil
   - B coal
   - C gasoline
   - D corn
5. all the following represent renewable resources of energy , except ....
   - a wood
   - B coal
   - C charcoal
   - D grass
6. coal is formed due to the decomposition of ancient dead ....
   - a plants
   - B animals
   - C humans
   - D birds
7. .... is made from wood
   - a gasoline
   - B charcoal
   - C grass
   - D natural gas
8. all the following are used to make liquid fuel , except ....
   - a wood chips
   - B corn
   - C charcoal
   - D grass
9. charcoal is described by ....
   - a being limited
   - B existing underground
   - C being a fossil fuel
   - D being made from wood
10. natural gas is formed from from the decomposition of .... under extreme pressure and temperatuer
    - a plants and animals
    - B sea creatures
    - C birds
    - D trees
11. one of the disadvantages of overusing biofuel is..................
    - a overfishing
    - B wildfire
    - C deforesstation
    - D rain

Put (✓) or (✕):

1. burning fossil fuel causes deforestation and pollution ( )
2. the amount of oil , water , and air on earth is limited ( )
3. we can conserve oil by using puplic transportation ( )
4. water may not be replaced as quickly as we need ( )

5. some plants are used to make liquid biofuel ( )
6. all type of fuel are extracted from underground ( )

arrange the following steps according to the formation of coal

1. The tree has been transformed into coal over millions of years. ( )
2. The tree remains are buried under the Earth's surface. ( )
2. The tree remains are exposed to high pressure and ternperoture. ( )
3. An old tree died, ( )

arrange the following steps according to the formation of Oil

1. They fall on the bottom of oceans. ( )
2. The organisms are exposed to high pressure and ternperature. ( )
3. They are covered with rocks and sediments. ( )
4. Some marine organisms died. ( )
5. Over millions of years, these remains are transformed into oil. ( )

Complete the following sentences :

1. Water is considered from .... resources of energy, while coal and .... are from nonrenewable resources of energy.
2. The natural resources that can be replaced shortly after being used are .... resources of energy.
3. The natural resources that are consumed at a rate faster than they can be renewed are called .... resources of energy.
4. Different forms of fuel can be classified into two main types which are .... and ....
5. The type of fuel that is produced from living organisms that can be planted is Called .... such as wood and................

6. Wood and .... are examples of biofuel, while .... and............. are examples of fossil fuel.
7. Wood chips and grass can be used to make a............. biofuel.
8. Oil formed from the decomposition of .... as a result of extreme heat ....

Correct the underlined words :

1. We have to increase planting vegetables and fruits that need <u>a large amount</u> of water. ( )
2. In houses, <u>gasoline</u> is used in cooking food as it is one of the oldest known biofuels. ( )
3. The nonrenewable resources of energy take a <u>short</u> period of time to be formed under the Earth's surface. ( )
4. <u>The moon</u> is the main source of both biofuel and fossil fuel. ( )



Living Without Electricity



العيش بدون كهرباء



Electricity can be generated from

يمكن توليد الكهرباء من

Renewable resources	**Nonrenewable Resources**
Such as	Such as
(Water - Wind)	(Oil - Natural gas)

- In many regions, electricity is generated from nonrenewable resources.
  في العديد من المناطق، يتم توليد الكهرباء من موارد غير متجددة.
- Using renewable resources is beginning to increase.
  بدأ استخدام الموارد المتجددة في الزيادة.

Electricity is very important in our lives and we should conserve it

الكهرباء مهمة جداً في حياتنا وعلينا أن نحافظ عليها



How can we conserve electricity

كيف يمكننا الحفاظ على الكهرباء

1. Turn off the lights we don't need أطفئ الأضواء التي لا نحتاجها
2. Unplug electrical devices after using them. افصل الأجهزة الكهربائية بعد استخدامها.
3. Set a regular electricity-free time. ضبط وقت منتظم خالي من الكهرباء.





Generating Electricity Using Fossil Fuel

توليد الكهرباء باستخدام الوقود الحفري

1 Fuel is burned
يتم حرق الوقود

2 Steam rises
يرتفع البخار

3 Steam turns a turbine

4 Turbine turns a generator

5 Electrical energy is transferred to homes
تنتقل الطاقة الكهربائيه الي المنازل

(1) Fuel is burned

(1) يحترق الوقود

- When fuel is burned, it produces thermal energy. عندما يتم حرق الوقود، فإنه ينتج طاقة حرارية.

(2) Steam rises (2) يرتفع البخار

- This thermal energy is used to heat water to make steam.
وتستخدم هذه الطاقة الحرارية لتسخين الماء لإنتاج البخار.

(3) Steam turns a turbine (3) يقوم البخار بإدارة التوربين

- The steam is directed through pipes and used to turn a device called "turbine".
يتم توجيه البخار عبر الأنابيب ويستخدم لتشغيل جهاز يسمى "التوربين".

(4) Turbine turns a generator (4) يقوم التوربين بتشغيل المولد

- The movement of the turbine produces kinetic energy, which is used to operate a generator. تنتج حركة التوربين طاقة حركية تستخدم لتشغيل المولد.
- When the generator is turned on, it converts the kinetic energy into electrical energy.
عند تشغيل المولد، فإنه يحول الطاقة الحركية إلى طاقة كهربائية.

(6) Electrical energy is transferred to homes

- Finally, the electrical energy travels through wires to homes to Operate different devices.

(6) يتم نقل الطاقة الكهربائية إلى المنازل

وأخيراً تنتقل الطاقة الكهربائية عبر الأسلاك إلى المنازل لتشغيل الأجهزة المختلفة.





scientific term

1. **renewable resources** — The eneray resources that include wind energy and water energy.
2. **thermal energy** — The energy released from burning fossil fuel.
3. **electrical energy** — The energy produced by the generator.
4. **steam** — A matter that is produced from heating water in an electric power station
5. **Turbine** — A device that operate generators.
6. **Generator** — A device in electric power station that changes the kinetic energy into electric energy

Give reason

1. **Generators are important in electric power stations.**
   Because generators convert kinetic energy into electrical energy.
2. **We must turn off lights that we do not need.**
   To conserve the electricity.

What happens if

4. **A generator that is connected to a damaged turbine in an electric power station.**
   Turbine cannot produce kinetic energy, so the generator will not turn and don't generate electricity.
5. **The movement of the turbine if the water in an electric power station is not heated.**
   Water will not produce steam, so the turbine will not move and will not produce kinetic energy.

words of the lesson

generator	مولد كهرباء
turbine	توربين
power plant	محطة توليد الكهرباء
steam	بخار
hydropower	الطاقة الكهرومائية
candle	شمعة
unplug	فصل
formation	تشكيل
marine	البحرية
pressure	ضغط
affected by	تتأثر
electrical appliances.	الأجهزة الكهربائية.



Exercises on Lesson 3

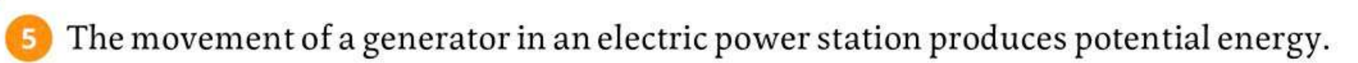
Choose the correct answer:

1. in many regions .... Generated from nonrenewable resources.
   a) oil B) natural gas C) electricity D) wood
2. .... is used instead of lamps when electricity is turned off.
   a) Candle B) Wool C) Paper D) Radio
3. How can you conserve electricity?
   a) By turning off the lights when | don't need them.
   C) By unplugging electrical appliances.
   B) By setting a regular electricity-free time.
   D) All answers are correct. a
4. .... energy is produced by burning fuel.
   a) Chemical B) Sound C) Thermal D) Solar
5. By heating Water, it turns into ....
   a) steam B) ice C) electricity D) fuel
6. .... change kinetic energy into electrical energy in the power plants. :
   a) Engines B) Generators C) Wires D) Fuel
7. The steam produced in the electric power station is directed to tubes to turn ....
   a) turbines B) motors C) mills D) lamps
8. Electrical energy travels thrOUGD cnn to homes and factories.
   a) tubes B) motors C) cables D) fans
9. .... and .... are included in fossil fuel's formation.
   a) Heating - cooling B) Burying - cooling C) Decaying - heating D) Decaying - growth
10. Water is turned into steam by the effect of .... energy
    a) electrical B) thermal C) kinetic D) mechanical

Put (✓) or (✗):

1. Any form of fossil fuels must be formed under the Earth's surface. ( )
2. Oil, natural gas and coal can be used to produce electrical energy. ( )
3. Turning off lights that we do not need iS a way to conserve electricity. ( )
4. Burning of fossil fuel inside electric power station produces kinetic eneray. ( )





5. The movement of a generator in an electric power station produces potential energy. ( )
6. We have to conserve all forms of fuel. ( )

Correct the underlined words :

1. Fossil fuels include oil, coal and <u>wood</u>. ( )
2. After death of living organisms, their remains are buried under the Earth's surface and exposed to extreme pressure and <u>cool</u>. ( )
3. Water is a <u>nonrenewable</u> energy resource. ( )
4. In an electric power Station, steam turns turbines that produce <u>thermal energy</u>. ( )
5. The movement of generator in the electric power station changes kinetic energy into <u>potential</u> energy. ( )

Complete the following sentences :

1. In electric power station, we use fossil fuels such as oil and natural gas which are considered as .... resources of energy.
2. Water is considered as .... resource of energy, and we can use it to generate ....
3. When fuel is burned in an electric power station, it produces .... energy to heat water.
4. Generators in electric power stations change .... energy into .... energy.
5. During generating electricity in electric power stations, the hot water produces ....which is used to turn turbines.
6. Turbines in electric power stations are turned by steam to produce .... energy required to operate the .... of the electric power stations.
7. Inside electric power stations, the burning of fuel produces .... energy, while the movement of turbines produces .... energy.

Big City Environmental Concerns
المخاوف البيئية للمدينة الكبيرة

- **The increase in people's needs and their industrial and agricultural activities causes many pollutions problems** إن زيادة احتياجات الناس وأنشطتهم الصناعية والزراعية تسبب العديد من مشاكل التلوث

Sources of Pollution in Big Cities

1 Burning fuel produces smog that pollutes the air.



2 Pesticides used in farms are carried into streams when it rains, causing soil and water pollution.



3 Using chemicals in factories pollutes the air, water, and soil.



Effects of Air Pollution on Humans' Health
آثار تلوث الهواء على صحة الإنسان

- **Smog from cars and factories in big cities causes:**

الدخان الناتج عن السيارات والمصانع في المدن الكبرى يسبب:

(1) Irritation of humans' eyes
(١) تهيج عيون الإنسان

(2) Irritation of humans' lungs
(2) تهيج رئتي الإنسان

(3) Damages the tissues of the respiratory system.
(3) إتلاف أنسجة الجهاز التنفسي.



- **Smog** الضباب الدخاني

➤ is full harmful small particles that irritate the lungs and cause damage to the tissues of the respiratoty system

عبارة عن جزيئات صغيرة ضارة مليئة بالجزيئات التي تهيج الرئتين وتسبب تلف أنسجة الجهاز التنفسي





Burning Fossil Fuel and Pollution

احتراق الوقود الحفري والتلوث

- Over time , the demand for energy has increased in order to supply electricity to homes , schools , businesses , and factorries مع مرور الوقت، زاد الطلب على الطاقة من أجل توفير الكهرباء للمنازل والمدارس والشركات والمصانع.
- the solution was to generate electricity by burning fossil fuel at the power plants
وكان الحل هو توليد الكهرباء عن طريق حرق الوقود الحفري في محطات توليد الكهرباء

Harms of Burning Fossil Fuel

أضرار حرق الوقود الحفري

- Burning fuel produces carbon dioxide gas, which is consider the main reason for **acid rain** and **global warming** وينتج عن حرق الوقود غاز ثاني أكسيد الكربون، الذي يعتبر السبب الرئيسي للأمطار الحمضية والاحتباس الحراري

acid rain
أمطار حمضية

How it is formed:

- Carbon dioxide gas combines with water in the air to form acid rain.

Harms:

- The death of trees.
- The change in the chemical nature of lakes and kill fish.
- The change in the chemical nature of soil.
- Dissolving some rocks including the rocks used for building.



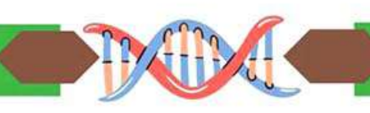
global warming
الاحتباس الحرارى

How it is formed:

- Increasing the amount of carbon dioxide gas in the air forms a layer in the atmosphere
- this layer traps heat on Earth causing a slow rise in the Earth's temperature, which is known as global warming.

Harms: للإطلاع فقط

- a rise in sea level, leading to the loss of coastal land, a change in precipitation patterns, increased risks of droughts and floods, and threats to biodiversity.



How to reduce acid rain and global warming

- **The only solution is to conserve energy** WHY?



reducing energy we use. → causes → Reducing the fossil fuel we burn, → causes → Reducing carbon dioxide we put in the air.







- Fossil fuel will run out of the earth if consumption is not rationalized

سوف ينفد الوقود الحفري من الأرض إذا لم يتم ترشيد الاستهلاك

- Conserving fossil fuel makes them last longer and keeps the Earth clean.

إن الحفاظ على الوقود الحفري يجعله يدوم لفترة أطول ويحافظ على نظافة الأرض.

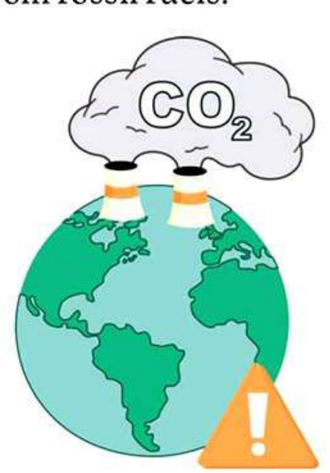
Conserving Fossil fuel

1. Walking or biking instead of driving a car.
2. Turning off the lights when you are not in the room.
3. Replacing fossil fuels with renewable energy resources such as : water, wind and solar energy.

Using renewable energy resources lead to

- energy resources will not run out,
- will not cause an increase in Earth's temperature
- it costs more money to produce energy from renewable resources than from fossil fuels.

Disadvantages of using Fossil fuel



- Fossil fuel is limited and could run out.
- When fossil fuel burns, it emits gases that cause:

a. Air pollution

b, Acid rain

c. Global warming

scientific term

1. **Global warming**: It is a phenomenon in which the Earth's temperature increases, when carbon dioxide gas increases in the air.
2. **Respiratory system**: It is a system in the human body that is damaged due to breathing a big amount of smog
3. **Acid rain**: It is a type of rain that is formed when carbon dioxide gas combines with water in the air.
4. **Fossil fuels**: The type of fuels that when burned, it produces gases which pollute the air.
5. **Smog**: it is released from cars and irritates human's eyes and lungs

Give reason

1. **it is necessary to conserve energy**
   to reduce the burning of fossil fuel and pollution
2. **fossil uel amount on earth is limited**
   because fossil fuel can't be renewed easily
3. **Engineers work on improving solar vehicles**
   because solar energy doesn't pollute the environment

What happens if

4. **If pesticides mix with water of canals and rivers.**
   It causes the pollution of water and soil.
5. **If acid rain falls on buildings for a long period of time.**
   It causes dissolving of the rocks used for building.

words of the lesson

concerns	مخاوف	available	متاح
industrial	الصناعه	warming	تسخين
agricultural	الزراعة	burning	احتراق
pesticides	مبيدات حشرية	combines with	يتحد مع
irritation	تهيج	obtain	يحصل على
damage	ضرر	related to	متعلق ب
tissues	أنسجه		
trap	تحبس		
acid rain	أمطار حمضية		
chemical nature	الطبيعة الكيميائية		
atmosphere	الغلاف الجوي		
global warming	الاحتباس الحرارى		
dissolve	تذوب		
pollutants	الملوثات		
disadvantages	سلبيات		
climate	مناخ		
unlimited	غير محدود		



Exercises on Lesson 4

Choose the correct answer:

1. Using chemicals in factories pollutes................
   - a) air
   - B) water
   - C) soil
   - D) all the previous
2. Smog damages the tissues of the................ system
   - a) digestive
   - B) circulatory
   - C) respiratory
   - D) nervous
3. Burning fossil fuel produces..................
   - a) natural gas
   - B) oxygen gas
   - C) carbon dioxide
   - D) oil
4. The death of trees is a result of.................
   - a) overfishing
   - B) acid rain
   - C) wind
   - D) temperature
5. Cars' smog causes irritation of humans' ....
   - a) small intestine
   - B) brains
   - C) hearts
   - D) eyes
6. Acid rain is formed when..............combines with water.
   - a) oxygen
   - B) carbon dioxide
   - C) hydrogen
   - D) nitrogen
7. The burning of fossil fuel causes.................
   - a) global warming
   - B) deforestations
   - C) acid rain
   - D) a and c
8. To reduce air pollution and global warming, we must...............
   - a) not use public transportation
   - B) turn on all home devices
   - C) drive cars faster
   - D) conserve fossil fuel
9. Using vehicles that are operated by ....conserves fossil fuel.
   - a) natural gas
   - B) solar energy
   - C) electricity
   - D) b and c
10. Increasing the amount of......... gas in the atmosphere causes global warming.
    - a) hydrogen
    - B) carbon dioxide
    - C) oxygen
    - D) nitrogen
11. Erosion of buildings and chemical changes in the soil are caused by...........
    - a) global warming
    - B) oxygen gas
    - C) deforestation
    - D) acid rain

Put (✓) or (✗):

1. Acid rain helps trees to survive. ( )
2. Global warming can dissolve some rocks. ( )
3. Global warming is one of the bad effects of using fossil fuels to produce energy. ( )
4. The heat trapped on Earth causes global warming. ( )

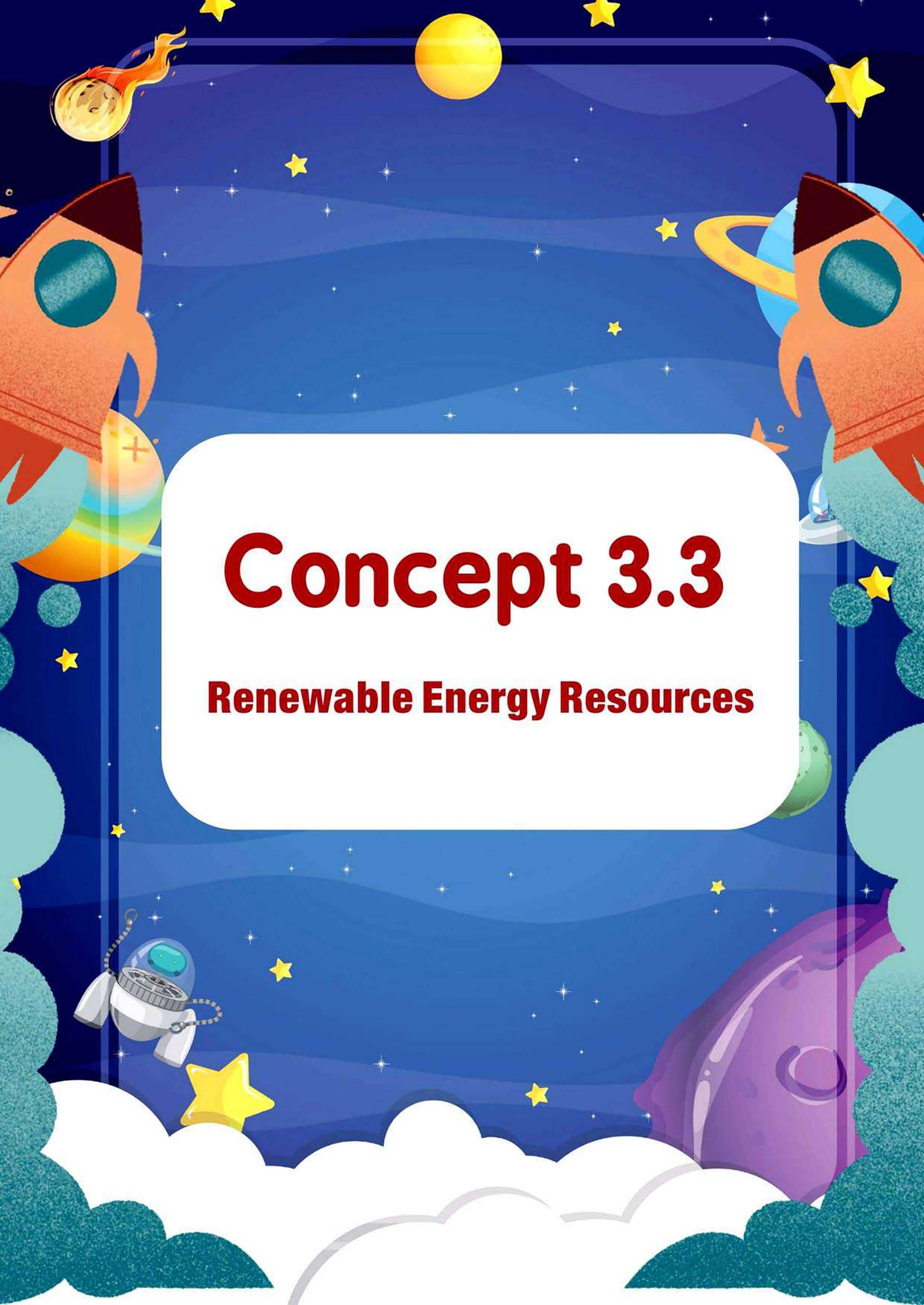
5. To reduce pollution and conserve nonrenewable resources of energy, we must decrease their use. ( )
6. When burning fossil fuels increases, the temperature on Earth decreases. ( )

Correct the underlined words :

1. The amount of <u>biofuels</u> cannot be replaced as quickly as it is used. ( )
2. Wood is a <u>fossil fuel</u> that is used in warming houses. ( )
3. Gases released from burning fossil fuels always <u>clear</u> the air. ( )
4. The heat trapped on Earth causes <u>acid rain</u>. ( )

Complete the following sentences :

1. 'Acid rain leads to change in the chemical nature of lakes causing death of................
2. Burning coal and oil produces .... gas which forms a layer in theatmosphere causing rise in the Earth's temperature in a phenomenon known as..................
3. The change in the chemical nature of .... due to rain may lead to the death of trees.
4. To conserve fossil fuels, we can replace them with renewable resources of energy such as water , ...and....................
5. Global warming causes the raise of .... on Earth and changes its ....
6. When fossil fuel is burned, it releases .... that cause air pollution and trap.............. in atmosphere.
7. If people do not conserve using of .... fuels, they will run out on Earth.
8. Using the .... resources of energy costs more money than using fossil fuels.
9. To avoid air pollution, we must use .... resources of energy such as .... , solar energy and .... energy.



Concept 3.3

Renewable Energy Resources





Renewable resources of energy: مصادر الطاقة المتجددة:

- They are natural resources that are replaced (renewed) in a faster rate than that of being consumed.

إنها موارد طبيعية يتم استبدالها (تجديدها) بمعدل أسرع من معدل استهلاكها.

We can generate electricity using different renewable energy resources.

يمكننا توليد الكهرباء باستخدام مصادر الطاقة المتجددة المختلفة.

Such as:



Solar Panels

Generate electricity to light streets using solar energy.



Water Turbines

Generate electricity using the kinetic energy of water.



Wind Turbines

Generate electricity using the kinetic energy of wind.

Windmills and Watermills

- Imagine you were born 400 years ago. تخيل أنك ولدت قبل 400 سنة.

Life was hard, and people needed machines to make their lives easier

Windmills and watermills were used to crush graine to make flour

كانت الحياة صعبة، وكان الناس بحاجة إلى الآلات لتسهيل حياتهم

تم استخدام طواحين الهواء والطواحين المائية لسحق الحبوب لصنع الدقيق



Windmills
طواحين الهواء



Watermills
الطواحين المائية



Way of working

Windmills:
1-The wind moves the mill's blades
2-The kinetic energy transfers to the internal parts of the mill

Watermills:
1-The water moves the mill's blades.
2-The kinetic energy transfers the internal parts of the mill.

Importance

They are used to crush (grind) grains and make flour.

يتم استخدامها لسحق (طحن) الحبوب وصنع الدقيق.

Advantages

- Low cost.
- Renewable energy resource.

Disadvantages

Windmills: Sometimes the wind doesn't blow, so it can't do its main job.

في بعض الأحيان لا تهب الرياح، لذلك لا يمكنها القيام بعملها الرئيسي.

Watermills: Sometimes, the water supply may dry up, so it can't do its main job.

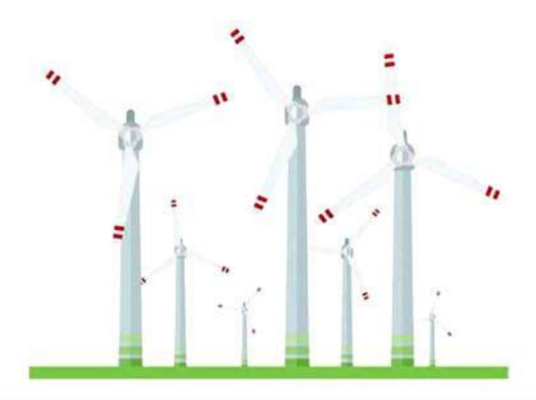
في بعض الأحيان، قد تجف إمدادات المياه، لذلك لا يمكنها القيام بعملها الرئيسي.



Modern turbines are used now instead of old windmills.

يتم الآن استخدام التوربينات الحديثة بدلاً من طواحين الهواء القديمة.

1-Modern Wind Turbines



2-Old Windmill





Function

1-Modern Wind Turbines	2-Old Windmill
They are used to generate electricity.	They are used to grind the grains to make flour.

Differences

1-Modern Wind Turbines

- They are taller than windmills.
- They have fewer blades than windmills.
- They have no opening in their blades

2-Old Windmill

- They are shorter than wind turbines.
- They have more blades than wind turbines.
- They have openings in their blades. blades.

Similarity

They depend on the kinetic energy of wind to be operated.

Modern water turbines



- They use the movement of water as an energy resource.
- They are used in generating electricity.

Old watermills



- They use the movement of water as an energy resource.
- They are used in crushing grain.

Using Energy From the Sun

- The Sun is the main source of all kinds of energy on the Earth.
- The Sun provides us with light and heat.



- Even at night, you feel the warmth of the Sun. حتى في الليل، تشعر بدفء الشمس.
- Because the atmosphere, water, and Earth's surface absorb the Sun's energy, causing a rise in the Earth's temperature. لأن الغلاف الجوي والماء وسطح الأرض يمتص طاقة الشمس، مما يتسبب في ارتفاع درجة حرارة الأرض



Solar Energy



1-Energy received from the Sun is called solar energy.

2-We can use solar energy as a source of thermal energy.

3-Sun rays are called radiant energy (radiation)

Uses of Solar Energy

1-Greenhouses	2- Warming	3-Cooking food	4-Heating water
			 

1- Greenhouses:

Importance

- They help farmers plant the crops that only grow in warm climates.
فهي تساعد المزارعين على زراعة المحاصيل التي تنمو فقط في المناخات الدافئة.

How does it work?

1-A greenhouse allows the entry of light and radiant energy from the Sun.

2-Radiant energy changes into thermal energy inside it.

3-Thermal energy warms the greenhouse from inside.







2- Warming:



Importance



a- Warming Ourselves

Solar energy can be used directly as a source of thermal energy when exposing yourself to the Sun to feel warm.

b- Warming Houses

Houses can be built in a way that enables the energy of the Sun to warm them by placing large windows on the wall that faces the Sun.

3- Cooking Food:



Through the use of



Convergent (concave/curved) mirrors:

المرايا المتقاربة (المقعرة/المنحنية):



They collect and focus sunlight to heat a metal pot and cook the food inside.

يقومون بجمع وتركيز ضوء الشمس لتسخين وعاء معدني وطهي الطعام بداخله.

4- Heating Water:



Through the use of



Solar water heater:

Structure : It contains panels made of black pipes. الهيكل : يحتوي على ألواح مصنوعة من الأنابيب السوداء.

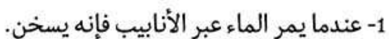
Location : It can be placed on the roof of a house. الموقع: يمكن وضعه على سطح المنزل



How does it work?

1- As water passes through the pipes, it heats up.

2- Water can then be stored in a hot water tank to be used later.



1- عندما يمر الماء عبر الأنابيب فإنه يسخن.

2- ويمكن بعد ذلك تخزين الماء في خزان الماء الساخن لاستخدامه فيما بعد.

scientific term

	Term	Definition
1	renewable energy resources	The energy resources that include wind energy and water energy.
2	sun	The primary source of energy on Earth.
3	concave mirrors	They are used to collect and focus sunrays towards the cooking pot
4	wind turbines	A device that the wind rotates its blades for generating electricity.
5	solar water heater	A device that consists of black pipes used to heat water.

Give reason

1. **People used windmills and watermills 400 years ago**
   to grind grains to make flour
2. **You feel the warmth of the Sun at night.**
   because atmosphere , water , and the earth's surface absorb the radiant energy of the sun causing a rise in earth's temperature
3. **Greenhouses are very important to farmers.**
   because they help farmers plant the crops that only grow in a warm climate

What happens if

4. **Wind moves the blades of windmills?**
   it produce kinetic energy to grind grain and make flour
5. **Wind doesn't blow in an area that contains wind turbines?**
   it will not generate electricity

words of the lesson

convergent mirrors	مرايا مجمعه	windmills	طواحين الهواء
metal pots	الأواني المعدنية	wind turbines	توربينات الرياح
concave mirrors	مرايا مقعرة	watermills	الطواحين المائية
curved mirrors	مرايا منحنية	water turbines	توربينات المياه
absorb	تمتص	solar panels	الألواح الشمسية
greenhouse	صوبه زراعيه	pipes	أنابيب
crops	المحاصيل	Placing	وضع
radiation	إشعاع		
grain	قمح		
crush	يطحن / يكسر		
blades	شفرات		
advantages	مزايا		
disadvantages	سلبيات / عيوب		
absence	غياب		
water areas	مناطق المياه		
benefits	فوائد		

Exercises on Lesson 1

Choose the correct answer:

1. All the following are considered renewable resources of energy, except...............
   - a wind
   - B coal
   - C the Sun
   - D water
2. Which of these is an example of a renewable energy resource?
   - a Gold
   - B Petroleum
   - C Water
   - D Aluminum
3. The main function of.............is grinding the grains and making flour.
   - a modern turbines
   - B solar panels
   - C dams
   - D watermills
4. Both modern wind turbines and old windmills are similar in their............
   - a blades number
   - B ways of working
   - C height
   - D blades shape
5. One of the disadvantages of wind energy is that..........
   - a its cost is high
   - B it does not blow sometimes
   - C it can't be renewed
   - D it is limited
6. In wind turbines, the ....energy of the wind is changed into electrical energy.
   - a kinetic
   - B thermal
   - C sound
   - D light
7. Modern turbines are ....than old windmills.
   - a longer
   - B shorter
   - C heavier
   - D slower
8. The source of all energies on the Earth is/are...........
   - a planets
   - B the moon
   - C the Sun
   - D stars
9. Which of the following structures is used by humans to capture and use sunlight as an energy resource?
   - a Cranes
   - B Dams
   - C Solar cells
   - D Turbines
10. Using concave mirrors in cooking is one of the benefits of using............
   - a wind
   - B water
   - C sand
   - D solar energy

Put (✓) or (✗):

1. Solar water heater is formed of panels made of black pipes. ( )
2. Placing large windows on the walls that face the Sun helps in warming houses. ( )
3. Both wind movement and water flow have kinetic energy. ( )
4. Both modern wind turbines and old windmills are used to generate electricity. ( )

5. Wind turbines generate electricity by using the energy of water flow. ( )
6. Windmills always do their job all the time, because the wind never stop blowing. ( )

Correct the underlined words :

1. Solar panels use <u>sound</u> energy to generate electricity. ( )
2. Water turbines generate electricity by using the energy of <u>wind movement.</u> ( )
3. <u>Manual</u> mixer depends on electricity to do its function. ( )
4. The <u>high</u> cost of producing energy in windmills is one of its advantages ( )
5. In the absence of the light of <u>moon</u>, living organisms cannot survive. ( )
6. Thermal energy and <u>sound</u> energy are produced from the Sun and reach the Earth. ( )

Complete the following sentences :

1. In electric power stations, the burning coal produces .... energy to generate electricity, while wind turbines generate electricity by using the .... energy of wind.
2. The water flow has kinetic energy, which moves the .... of water turbines to transform this energy into .... energy.
3. Both .... and................ are used to crush grain hundreds of years ago.
4. Although modern wind turbines and old windmills vary in shape, they all use.................energy to be powered.
5. Both wind and water movement produce .... energy that is used to rotate turbines to generate .... energy.
6. The solar energy is produced from the .... , and the .... energy is a type of this energy which is carried by sun rays.
7. When we expose our bodies to the Sun, we feel ....
8. We can use solar energy in cooking by using .... which collect and focus .... onto metal pots to heat them.

Solar Panels



Importance

- Most solar panels are used to generate electricity.



Structure:

- It consists of a large number of small solar cells.

How do they work?

- Solar cells catch the radiant energy coming from the Sun and turn it directly into electricity.

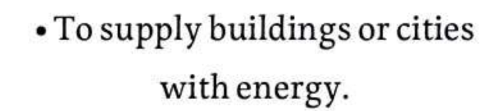
Solar panels can be



Very Small

- To supply only one light bulb with energy.

Very Large



- To supply buildings or cities with energy.





Uses of electricity generated by solar panels

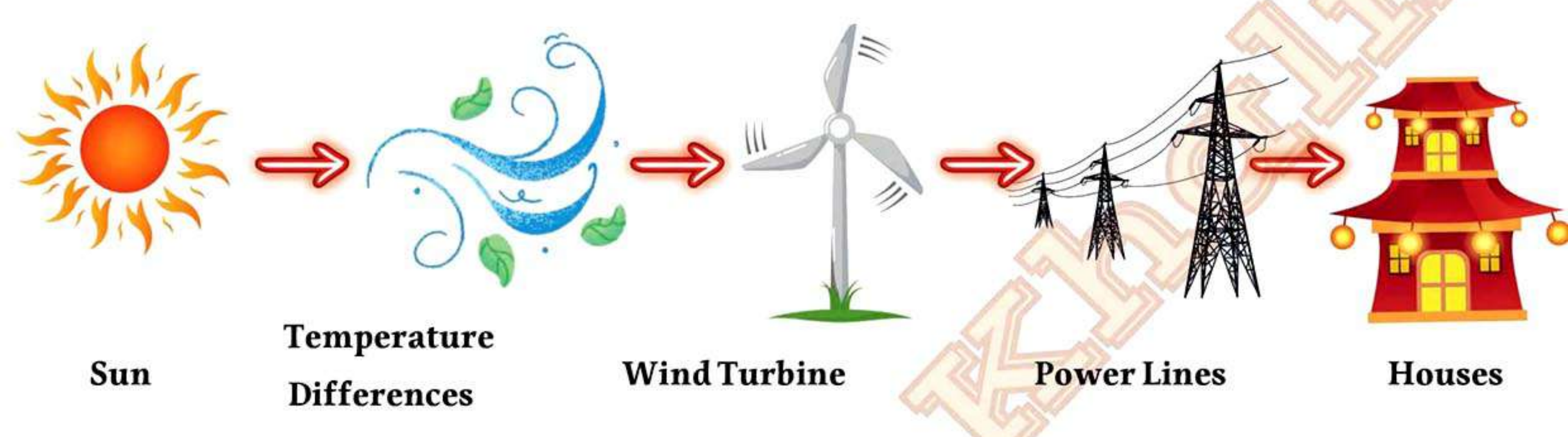
- It can be used directly to light streets.
- It can be used to operate electric devices.
- It can be used to recharge some types of batteries, like solar-cell calculators.
- It can be used to power irrigation equipment in some villages.





Harness the Wind

- As the Sun warms Earth, it warms the air.
- Different parts of the world get different amounts of solar energy causes the air to move and the wind to blow.



1. Solar energy causes the air to move and the wind to blow
2. The kinetic energy of wind rotates the blades of wind turbines that are used to spin generators.
3. Generators change kinetic energy into electrical energy.
4. Electricity is transferred through big wires towards cities to houses and streets.



NOTES • **When the kinetic energy of the wind increases, the blades rotate fast**

scientific term

	Term	Definition
1	wind turbine	A device that the wind rotates its blades for generating electricity.
2	the sun	It produces radiant energy that causes the wind to blow.
3	Generator	The device in an electric power station that turns kinetic energy into electrical energy.

Give reason

1. **Some electrical devices have solar panels which are composed of many solar cells.**
   To absorb the solar energy coming from the Sun and convert it into electrical energy.
2. **Kinetic energy of wind affects the speed of wind turbine blades rotation.**
   Because by increasing kinetic energy of the wind, the blades rotate faster and wind turbine generates more electricity.
3. **Sometimes the wind turbines are useless.**
   Because sometimes the wind doesn't blow, so their blades don't move, so wind turbines don't generate electricity.

What happens if

4. **The solar cells in a calculator are exposed to sunlight.**
   The solar cells absorb solar energy and convert it into electrical energy that is used to charge the battery of calculator.
5. **The kinetic energy of a wind that is applied on the wind turbine increases.**
   Its blades rotate faster and generates more electricity.
5. **There is difference in temperatures of air around Earth.**
   it causes the movement of air and wind blowing.

words of the lesson

solar cells	الخلايا الشمسية
spin	يلف
vary	يتغير
harness	تسخير
wires	الأسلاك
efficiency	كفاءة
transmitted	ينقل
degrees	درجات
composed	مكون
irrigation	الري
Opposite to	مقابل / مضاد
electric iron	مكوه كهربائيه
through	خلال

Exercises on Lesson 2

Choose the correct answer:

1. Solar panels can be used to operate all the following, except.............
   - a) a calculator
   - B) gas oven
   - C) irrigation equipments
   - D) street lights
2. The...........energy of the Sun causes air movements and wind blowing.
   - a) chemical
   - B) radiant
   - C) electrical
   - D) sound
3. The difference in temperature between cold and hot air causes............
   - a) rain
   - B) a shadow
   - C) wind blowing
   - D) a rainbow
4. ....change the kinetic energy of turbines into electrical energy.
   - a) Motors
   - B) Panels
   - C) Generators
   - D) Fans
5. The correct arrangement for generating electricity from wind energy is:......................
   - a) Sun - wind - power lines - wind turbines - houses
   - B) Sun - wind - wind turbines - power lines - houses
   - C) Sun - wind turbines - power lines - wind - houses
   - D) Sun - wind turbines - wind - power lines - houses

8. Which statement is true?
   - a) The wind rotates the blades of watermills.
   - B) Electricity is transferred to cities through wind.
   - C) Solar energy causes the wind to blow.
   - D) Generators are used to spin turbines.
11. The electricity from wind turbines is transmitted into houses and factories through.............
   - a) the wind
   - B) solar panels
   - C) generators
   - D) wires

Put (✓) or (✗):

1. A solar panel consists of one small solar cell. ( )
2. Wind is a renewable energy resource. (Qalyobia 2023) ( )
3. There is a similarity in temperatures between cold and hot air. ( )
4. In wind turbines, the kinetic energy is converted into chemical energy. ( )

5. Electricity generated by wind turbines is transmitted through wind. ( )
6. When air blows into the wind turbine weakly, the blades spin slowly. ( )

Correct the underlined words :

1. Small solar panels are used to supply one light bulb with <u>sound</u> ( )
2. <u>Potential energy</u> of the wind is converted into electrical energy by wind turbines. ( )
3. The difference in temperatures between cold and hot air causes air to <u>stop.</u> ( )
4. <u>Water</u> turbines rotate when their blades rotate as wind blows. ( )
5. When air blows into the wind turbine strongly, the blades spin <u>slower</u>. ( )

Complete the following sentences :

1. Solar cells that convert radiant energy coming from the sun rays into............ energy.
2. Solar cells that are found in some calculators produce .... energy that is used to recharge their................
3. In some villages, solar panels are used to generate .... energy that is used to operate .... equipment.
4. Wind is formed due to the effect of .... energy coming from the .... in the form of rays.
5. Wind blows due to the difference in .... between the cold air and the hot air.
6. The rotation of blades of wind turbines is caused by .... energy that is created by wind movement.
7. When wind turbines rotate, ... energy is converted into .... energy.
8. When wind blows into a wind turbine with a large force, its blades rotate .... than that when wind blows into it with a small force.
9. By increasing the rotation of wind turbine blades, the wind turbine generates more .... energy

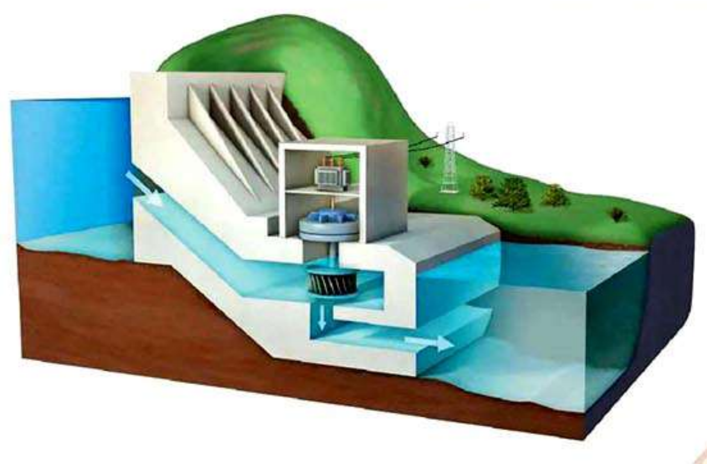


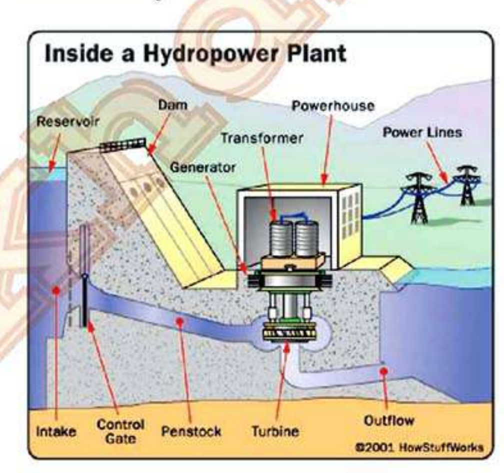
Falling Water

- As rivers run downhill, they change gravitational potential into kinetic energy
- **dams are blilt on rivers**

1. To control the flow of water.
2. To increase potential energy of water

How can water be used to generate electricity





1- A hydroelectric dam holds back the flow of water to increase its potential energy
2-When the water is released, it passes through the blades of turbines, so they rotate.
3 -Turbines operate generators, so kinetic energy is converted into electrical energy
4- Electricity is transferred to cities through long electric wires.

Hydroelectricity: (Hydroelectric energy)

It is a type of electrical energy generated by water turbines in dams.



Water Turbines

Differences

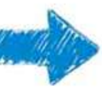
Wind Turbines	Water Turbines
They are used in windy places.	They are used in places where dams are built on rivers.

Similarities

1-Both of them depend on renewable resources.
2-Both of them use kinetic energy to turn turbines.
3-Both of them are used to generate electricity.

- The blades rotate when water is poured over them.
- The blades stop when the water completely runs out.

We conclude



Moving water has kinetic energy that is used to run water turbines to generate hydroelectricity.

Water Cycle

- The river's water does not return to its source, but it flows into other bodies of water.
- Water evaporates and then condenses into clouds.
- When rain falls from these clouds, the water returns to the river.

scientific term

1. **Water turbine** — A turbine that converts the energy of falling water into electrical energy.
4. **Water turbine** — A turbine in which the kinetic energy of moving water is used to generate hydroelectric energy.
2. **Hydroelectric energy** — A type of electrical energy generated by water turbines in dams.
3. **Hydroelectric dam** — A type of dams that is used to generate electricity using the flow of water.
5. **Evaporation process** — A process in which water changes into water vapor.

Give reason

1. **Hydroelectric dams are built on rivers.**
To control the water flow and increase the potential energy of water to generate electricity.
2. **Water turbines are placed in waterfalls areas.**
Because water turbines convert kinetic energy of flowing water into electrical energy.
3. **Some dams contain water turbines.**
Because kinetic energy of moving water in dams is used to rotate water turbines to generate hydroelectric energy.

What happens if

4. **Dams hold back the flow of water**
the potential energy of the water will increase
5. **the water of dams become free**
its potential energy will change into kinetic energy

words of the lesson

condense	تكثف
evaporate	تتبخر
water vapor	بخار الماء
clouds	سحاب
refill	اعادة تعبئه
source	مصدر
pour	يصب
water cycle	دورة المياه
model	نموذج
fix	يصلح
hydroelectric	الطاقة الكهرومائية
water flow	تدفق المياه
dams	السدود
gravitational	الجاذبية
downhill	انحدار
prevent	يمنع

Exercises on Lesson 3

Choose the correct answer:

1. Water flows through turbines in hydroelectric dams to generate .... energy.
   a) electrical B) potential C) solar D) light
2. In water turbines, the .... energy of water is changed into electrical energy.
   a) chemical B) kinetic C) thermal D) light
3. The reason of flowing of river water downhill is the .... force.
   a) pushing B) friction C) gravitational D) electrical
4. Using of water to generate electricity depends on places ....
   a) with strong winds. B) where dams are built on rivers.
   C) with weak winds. D) where boats sail in rivers.
6. Both waterfalls and .... are renewable energy resources.
   a) wind B) coal C) oil D) fossil fuel
7. The water behind a dam stores .... energy.
   a) kinetic B) thermal C) potential D) electrical
8. Both water and wind use .... energy to operate turbines.
   a) kinetic B) thermal C) electrical D) solar
9. The form of energy resulted from waterfalls is called .... energy.
   a) thermal B) chemical C) solar D) hydroelectric
10. Which of the following is a renewable energy resource PR shodesnsees
   a) Running bicycle. B) Running car. C) Running water. D) Running person.
11. In the water cycle, water .... ,then it............. before falling in the form of rains.
   a) freezes — evaporates B) evaporates — condenses C) evaporates — freezes D) condenses — evaporates

River water evaporates by the help of heat produced from ....
   a) kettles. B) the Sun. C) electric heaters. D) electric iron.

Put (✓) or (✗):

1. When water becomes free, potential energy is changed into kinetic energy. ( )
2. The flow of water in dams can be controlled to generate electricity. ( )
3. Electricity generated from water is called hydroelectricity. ( )
4. Rivers store kinetic energy. ( )



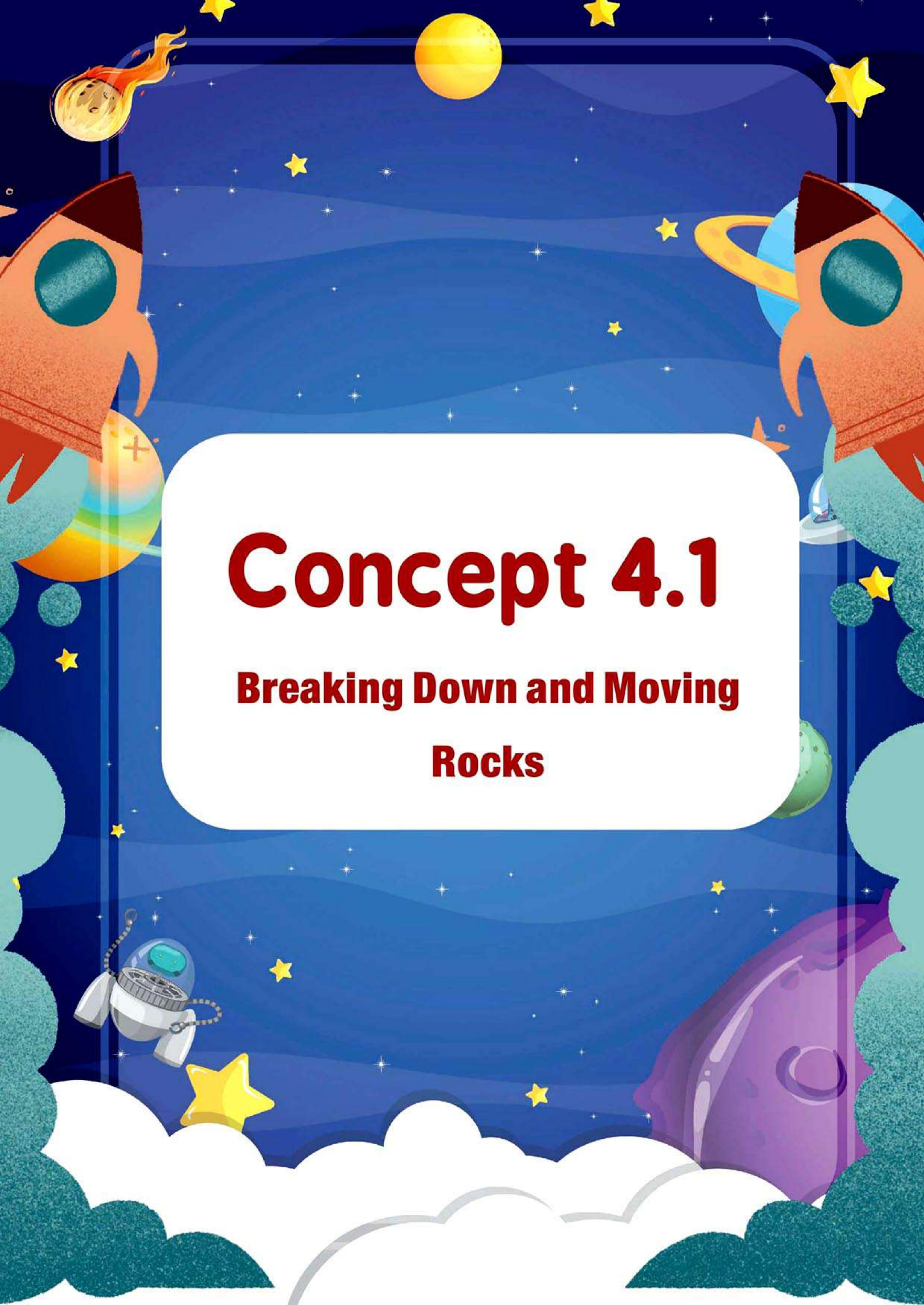
5. The electricity produced by water is known as electromagnetic energy ( )
6. When water falls down on waterfalls, its kinetic energy decreases ( )

Correct the underlined words :

1. The thermal energy generated by water turbines in dams is known as hydroelectricity. ( )
2. During the flowing of rivers water downhill, the chemical potential energy of water is converted into kinetic energy. ( )
3. Dams are built on rivers in order to generate solar energy. ( )
4. The electrical energy is generated by wind turbines in dams. ( )

Complete the following sentences :

1. When rivers flow downhill, ... energy of water is converted into .... energy that rotates water turbine.
2. People build .... on rivers to control the water flow and increase its .... energy that is converted into .... energy in water turbines that is used to light houses.
3. Dams control the flow of.......... that causes the increase of the .... energy of water.
4. The type of electrical energy which is produced by water turbines is called ....
5. Water and .... are from the renewable resources of energy which use .... energy to operate turbines and generate ....
6. We can use a device known as wind .... to generate electricity in places where strong air blows.
7. Water turbines are used to generate electricity in places which have waterfalls or .... , while wind turbines are used in places with strong ....
8. Hydroelectricity is generated by using water .... in dams.
9. Renewable energy resources include .... and...............
10. The movement of water in river is used to rotate water .... to generate electricity. ,

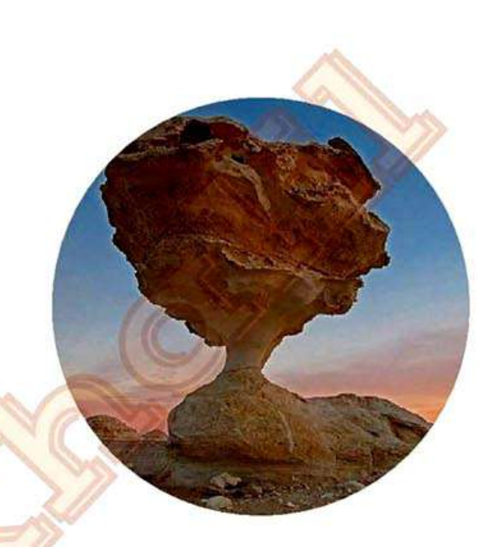


Concept 4.1

Breaking Down and Moving Rocks

The Earth's surface is always changing due to the effects of wind, water, and weather changes

For Example:



Wind can break down rocks and move small particles of rocks from one place to another.



Water can break down rocks and change the shapes of rocks.

Examples of Erosion

Sandcastles Erosion:

- Water waves break sandcastles down after a few hours.
- Water waves can move sand particles to other places.

Beach Erosion:

- The movement of the waves causes erosion of the beach over time.



NOTES

- Sand particles are formed from the breaking down of rocks.
- Wind and water can transport sand particles from one place to another.



Earth's surface is changing by two ways:

Fast Changes

- Some changes to the Earth's surface happen so quickly, such as:
- The disappearing of sandcastle after few minutes when water waves hit it.



Slow Changes

- Some changes to the Earth's surface happen very slowly, such as:
- A little change may happen in shape of coastal rock after many years because some parts of the rock break off.

Similarities between sandcastles and coastal rocks:

- Both have steep needle-like parts and sloping sides at the bottom.
- They are formed by the effect of water and wind.

Canyons

They are deep valleys carved by the flowing water.

Shape:

- The canyon has steep needle-like parts and slopes at the sides

Time of Formation:

- The canyon takes many years to be formed.

Way of Formation:

- The canyon is formed by the effect of water.





scientific term

1	Erosion of the sandcastle.	The disappearance of a sandcastle as a result of its hitting with the sea waves.
2	Canyons	They are deep valleys carved by flowing water.
3	Costal rocks	Rocks that are found near seashores and broken by the effect of wind and water over long periods of time.

Give reason

1. **The Earth's surface is always changing.**
   due to the effect of wind , water and weather conditions
2. **Changes to the Earth's surface occur at different times.**
   because some changes are fast and some are very slow
3. **The sandcastle completely disappears after a short time.**
   because it is washed away by sea waves
4. **There may be a little difference in the shape of coastal rocks after a lot of years.**
   because water and wind may break off some parts of its rocks

What happens if

5. **Waves of seawater hit your sandcastle?**
   the sandcastle will disappear after a while
6. **A sandcastle and a coastal rock are left for an hour?**
   the sandcastle will be disappeared and the coastal rocks will be the same

words of the lesson

inclined sides	الجوانب المائلة	erosion	التعرية
needle-like	تشبه الإبرة	weathering	التجوية
coastal rocks	الصخور الساحلية	rocks	الصخور
slopes	المنحدرات	factors	عوامل
valley	الوادي	break down	تفتت
carved	منحوتة	landscape	مظاهر السطح
sandcastles	القلاع الرملية		
footprints	اثار الاقدام		
natural erosion	التآكل الطبيعي		
coasts	السواحل		
transport	ينقل		
notice	يلاحظ		
disappearance	اختفاء		
responsible for	مسؤولة عن		
canyon	الوادي		
deposition	ترسيب / إيداع		
particles	جزيئات / حبيبات		

Exercises on Lesson 1

Choose the correct answer:

1. ……………can change the features of the Earth's surface.
   - a) Water
   - B) Wind
   - C) Weather
   - D) All the previous
2. All the following are landscapes that have changed over a long time , except …………..
   - a) canyons
   - B) sandcastles
   - C) coastal rocks
   - D) mountains
3. Which of the following shapes may disappear quickly?
   - a) Canyons
   - B) Footprints on sand
   - C) Coastal rocks on the beach
   - D) Mountains
4. Sandcastles may be wrecked by the force of………..
   - a) water
   - B) wind
   - C) gravity
   - D) a and b
5. Sandcastles will……….after one year.
   - a) still the same
   - B) become stronger
   - C) disappear completely
   - D) partially affected
6. Steep valleys formed due to flowing water erosion are called………….
   - a) hills
   - B) sand dunes
   - C) canyons
   - D) deltas
7. A canyon may take………….to be formed.
   - a) minutes
   - B) hours
   - C) days
   - D) years

Put (✓) or (✗):

1. The surface of the Earth changes from time to time. ( )
2. Water stream can break down rocks into smaller pieces. ( )
3. When large particles of rocks are broken into smaller particles, they can be carried by the moving wind. ( )
4. If you walk on the seashore and come the next day searching for your footprints, you will find them unchanged. ( )
5. All changes that occur on the Earth' surface take hundreds of years. ( )
6. Water and wind are artificial forces that are responsible for the erosion of sea coasts. ( )
7. The changes that are observed in the formation of a canyon are faster than that observed in the disappearance of a sandcastle. ( )

Correct the underlined words :

1. The Earth's surface is stable as time passes. (   )
2. Gravity can change the shape of canyons. (   )
3. The sandcastle becomes stronger after being hit by waves. (   )
4. The shape of the canyon was formed in a very short time. (   )

Complete the following sentences by using the words between brackets

(slow — erosion — fast — rocks — wind — water)

1. The shape of coastal rocks is affected by the forces of................ and wind.
2. The origin of sand is the breaking down of some types of ....
3. Air moving from an area to another and has a role in breaking down of rocks into smaller particles is known as ....
4. The process of transporting small rocks from one place to another by the help of water or wind is known as ....
5. Disappearance of a sandcastle is an example of... changes, while formation of a canyon is an example of .... Changes

Shaping the Earth

There are three main processes that may cause changes to the Earth's surface

1. This area shows the breaking down of large rocks into small particles (sediments), this process is known as "weathering".

2. This area shows the movement of sediments from one place to another, this process is known as "erosion".

3. This area shows the dropping (laying) of sediments in a new place, this process is known as "deposition".



Sediments could be sand , rock, or soil.

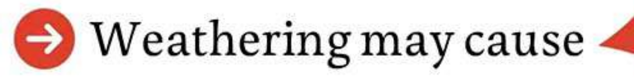
what is Weathering?

What is the weather outside today? Is it sunny or rainy, windy or icy?

- All these factors are part of the weather and are also involved in weathering.
- Weather and weathering are different where,

Weather
Is the condition of the atmosphere at a specific place.

Weathering
Is the process of breaking down rocks into small (tiny) particles.



Weathering may cause

- A breakdown (crumbling) of status.
- Paint to peel on a building.
- Waves to pull sand from the beach.

NOTES

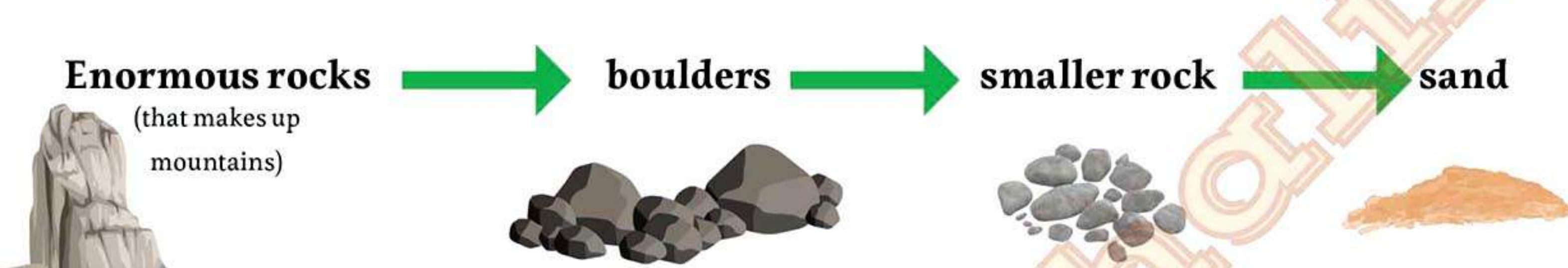
- Weathering breaks down big rocks into tiny rocks, then into pebbles or sand grains.
- Knowing the weather helps you decide what to wear when you go outside.





Types of Weathering

- Weathering is one of the factors that changes the Earth's surface
- If you have seen rocks of different sizes, this is evidence of weathering



Types of Weathering

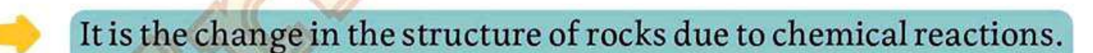
1- Chemical Weathering

The process of breaking rocks down with a change in their structure (nature) due to chemical reactions.

2- Mechanical Weathering

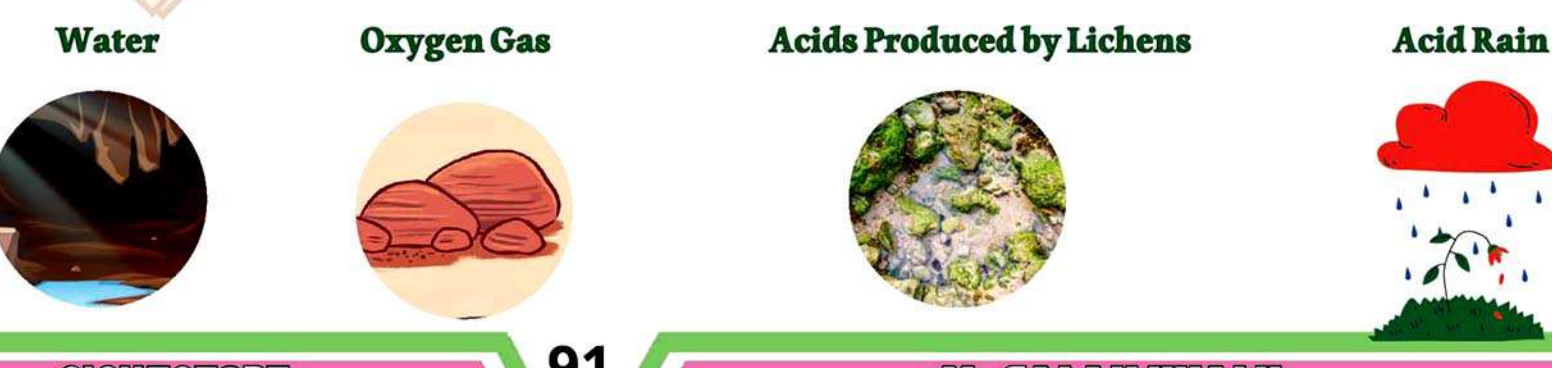
The process of breaking rocks down without a change in their structure (nature) due to physical factors.

1-Chemical Weathering



It is the change in the structure of rocks due to chemical reactions.

Reasons (Factors) of Chemical Weathering





1- Water:

As water runs over rocks:

- It dissolves some minerals in rocks. This makes the rocks fall apart.
- Dissolved minerals combine again to form new shapes, as in a limestone cave.



Most caves are formed due to this type of chemical weathering.

2-Oxygen Gas:



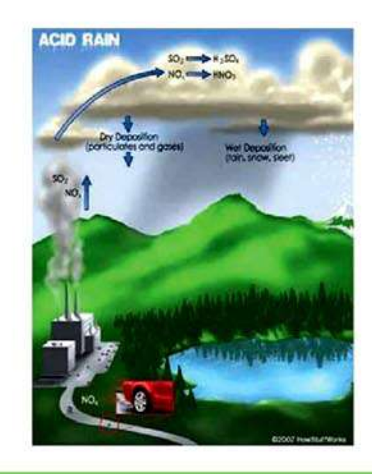
Oxygen in the air reacts with iron in some rocks forming red-colored rust.
This reaction also weakens rocks, causing them to break more easily

3-Acids Produced by Lichens:



Lichens are tiny plant-like organisms that produce acids on rocks as they grow.
Over time, acids dissolve minerals found in these rocks, and break them down easily.

4- Acid Rain:



Acid rain can also dissolve minerals found in these rocks, causing the breakdown of rocks.



2-Mechanical Weathering



It is the breaking down of rocks due to the effect of physical factors.

Physical Factors:

Reasons for Mechanical Weathering

Temperature **Wind and Sand** **Flowing Water** **Plant Roots**

1-Temperature:

Water and temperature often work together to break rocks.

Water flows into the tiny cracks in the rock

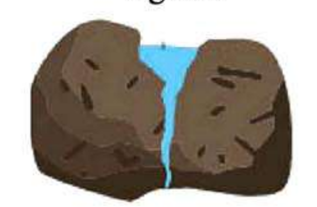
When the temperature is very cold,water freezes and expands,so the cracks become wider.

when temperature increases, ice melts, and water fills the newly formed cracks again.

The cycle of melting and freezing continues until rocks are broken down.









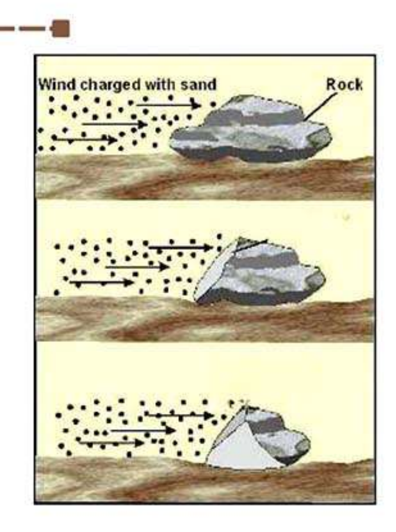
2-Wind and Sand:

- **Sand and wind team up to wear down large rocks.**

1-Wind rushes sand on the rock surface.

2-Friction occurs between sand and rocks.

3-This causes the smoothing of rocks and breaks them down.





Friction between sand and rocks is like the force of sandpaper a piece of wood.



3- Flowing Water:

- Flowing water, full of small bits of floating gravel and sand, scours the rough edges of boulders.
- Rushing water causes rocks to tumble over one another, breaking larger pieces when collisions occur.

4- Plant Roots:



1.Plant roots grow inside the cracks of rocks.
2. Cracks become wider.
3. Rocks are broken down

- We can see the effects of weathering all around us in the little rocks,pebbles, and sand that were parts of much larger structures.

➔ is hard to see weathering in action.

- Because weathering happens over long periods of time.

A model of mechanical weathering

Mechanical weathering breaks down rocks into smaller pieces without changing their structure.

A model of chemical weathering

Chemical weathering breaks down rocks into smaller pieces, and changing their structure.

Chemical weathering causes greater changes to substances than mechanical weathering.

- Because chemical weathering causes a completely new different matter, while mechanical weathering breaks the matter down into small pieces without changing it.



scientific term

	Term	Definition
1	erosion	The process of moving rocks from one place to another
2	weathering	The process of breaking boulders down into smaller rock particles.
3	deposition	The process of laying sediments down.
4	mechanical weathering	• The kind of weathering that takes place by the effect water and temperature • it is a type of weathering that breaks rocks down without changing their matter
5	chemical weathering	• The kind of weathering that changes the structure and color of rock • it is a type of weathering that occurs in rocks and leads to the formation of a completely different material
6	lichens	They are tiny, like plants, that live on rocks and produce acid on them.
7	oxygen	The gas that causes the red-colored rust on some rocks.
8	root	A part of the plant that breaks down rocks as they grow through them.
9	limestone cave	A type of caves formed due to combination of dissolved minerals of rocks.
10	iron	A mineral in rocks that reacts with oxygen forming red-colored rust.

Give reason

1. **Iron in rocks may rust.**

   Due to the reaction between iron and oxygen of air.

2. **Water play an important role in the formation of limestone caves.**

   Because water dissolves minerals in rocks, then this dissolved minerals combine again forming new shapes.

What happens if

4. **Lichens growing on rocks produce acids.**

   . The minerals of these rocks dissolve causing their breaking down.

5. **Ared-colored rust is formed on some rocks.**

   These rocks become weak and can break down easily.



words of the lesson

minerals	المعادن
limestone	الحجر الجيري
combine	يجمع
cave	كهف
lichens	الأشنات (كائنات حيه دقيقه تشبه النباتات)
freeze	تجميد
melting	ذوبان
weaken	يضعف
expands	يتوسع
produce	ينتج
reaction	تفاعل
acid rains	الأمطار الحمضية
pebbles	الحصى
periods	فترات
rust	الصدأ
cracks	الشقوق
wider	أوسع

sediments	الرواسب
dissolve	تذوب
mechanical	ميكانيكي
chemical	المواد الكيميائية
statues	تماثيل
paints	الدهانات
condition	حالة
specific	محدد
atmosphere	الجو
pulling	سحب
dropping	اسقاط

Exercises on Lesson 2

Choose the correct answer:

1. The condition of atmosphere including temperature, wind and rains is known as...............
   a weather. B weathering. C erosion. D deposition.
2. The dropping of sediments in a new place, is known as ....
   a weathering. B deposition. C freezing. D erosion.
3. Limestone caves are formed due to the combination of...............
   a dissolved minerals. B red-colored rusts. C living organisms. D acid rains.
4. Lichens produce on rocks that dissolve minerals found in these rocks.
   a oxygen B acids C water D rain
5. Rusting of a statue is an example of the action of ....process.
   a deposition B erosion C mechanical weathering D chemical weathering
6. Breaking of statues is an example of............
   a erosion. B weathering. C deposition. D sedimentation.
7. All the following are processes that can change the Earth's surface, except..............
   a digestion. B erosion. C weathering. D deposition.
8. When water freezes, it expands. This means that..............
   a it will evaporates. C its temperature increases.
   B its volume increases. D its volume decreases.
9. 9. All the following are from causes of chemical weathering, except
   a oxygen. B water. C acid rains. D clouds.
10. 10Water can produce that affect(s) the shape of the Earth.
    a mechanical weathering only B chemical weathering only
    C both mechanical and chemical weathering D neither mechanical nor chemical weathering

11

Put (✓) or (✗):

1. The deposition process takes place before the erosion process. ( )
2. We can see weathering in action everywhere around us. ( )
3. Weathering is the condition of the atmosphere in an area. ( )
4. Living organisms may cause mechanical and chemical weathering. ( )

5. Acid rain has the same effect on rocks as plant roots. ( )
6. Melting and freezing change the volume of water in a rock's cracks and make them wider. ( )
7. The broken down statues are evidence of the deposition process ( )
8. Plant roots help in the formation of rocks. ( )
9. Rocks become stronger when iron found in them rusts. ( )
10. Wind is one of the agents that cause weathering. ( )

Correct the underlined words :

1. The shaping of the Earth's surface begins with erosion process ( )
2. When oxygen reacts with the iron in rocks, a green-colored is formed. ( )
3. Stems of plants grow inside cracks of rocks, causing them to break down. ( )
4. Carbon dioxide in the air always causes rust on rocks. ( )
5. Limestone caves were formed due to mechanical weathering. ( )
6. As plant roots grow inside rocks, the cracks become narrower. ( )
7. The origin of sand is the breaking down of glass. ( )

Complete the following sentences :

1. During .... process, rocks are broken down or weared away.
2. There are two types of weathering which are .... Weathering and ....weathering.
3. The type of weathering in which the rocks are broken down due to plant roots is known as .... Weathering.
4. The type of weathering in which the Structure of rocks changes due to chemical reactions is known as .... weathering.
5. Lichens produce acids on rocks that dissolves its ....
6. Mechanical weathering takes place when............ occurs between sand carried by wind and rocks.
7. Flowing water which carries small gravel and sand may break down large .... and cause .... weathering.

When rocks are weathered, they are broken down into smaller pieces, so these small pieces are ready for erosion.

Erosion

It is the process of moving small particles of sand, soil, or rocks from one place to another.

Factors affecting erosion

Gravity - Wind - Water

1- Erosion by Gravity:

- Gravity pulls broken rocks down a mountainside.

2-Erosion by Wind:

- The wind carries grains of sand from one place to another.
- A gentle wind moves grains of sand for a short distance (about meter)
- Stronger wind will blow more sand for a longer distance.

3-Erosion by Water:

Rivers and floods erode rocks and soil from their banks and carry them downstream.	Sea waves pull sand away from beaches.	Rain washes the soil on farms that are located beside downhills.

Sometimes you can see erosion happening, such as:

1. During flash floods, hurricanes, or landslides.
2. You may see sediments carried down gutters by water runoff after a big rainstorm.
3. The water in a nearby creek appears muddy.

Sediments:

They are pieces of weathered rocks that are moved by gravity, wind, and water.

Deposition

It the process of settling rocks and soil in a new place Deposition after they have moved by erosion.

FREEZE

LAKE

OCEAN

1- Rocks can be broken into smaller pieces through weathering

2- These pieces are carried away through erosion

3-At the end, the sediments settled by deposition.

How does deposition occur?

1-As the wind blows, it picks up sand, then tosses it around in the air.

2- As the wind moves, sand travels with it.

3-When the wind stops blowing, the sand falls to the ground and is deposited.





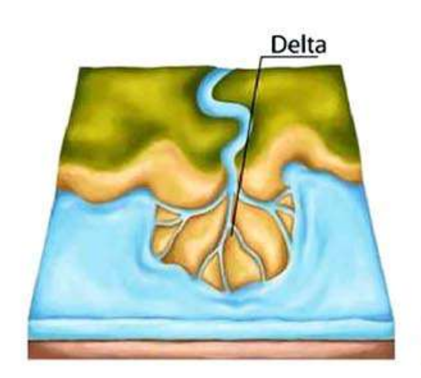

The role of deposition by water

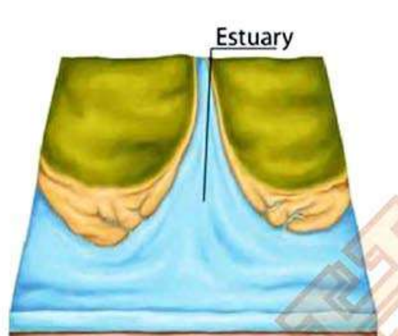
- Ariver may deposit a sand bar along its banks.
- A river could carry sediment, and when the river meets the sea, sediments may be deposited.
- This forms a delta, such as the Nile Delta.



Delta

It is a fan-shaped (triangle-shaped) that has a mass of mud and sediments formed when a running river enters a large water body (sea or ocean)







The role of deposition by wind

- Strong wind can form large sand dunes, such as:
  1. Western Desert in Egypt
  2. Rub' Al Khali in Arabian Peninsula.

- Weak wind can form small sand dunes, such as:
  Small dunes on a beach.

Erosion and deposition are linked processes

If rocks become eroded  they must be deposited

If you see a deposit of sand  it has already been eroded somewhere else.

Weathering

Weathering is caused when wind or water break down the rocks and change the shape of the landform by mechanical or chemical processes.

Erosion

Erosion is caused when wind or water move material from one place to another.

Deposition

Deposition occurs when eroded materials stop moving and settle on a surface, often forming layers over time.



scientific term

	Term	Definition
1	erosion	It is the process that occurs when soil is moved from one place to another.
2	gravity	It is an eroding factor that pulls the rocks down mountainsides.
3	river	It is an eroding factor that moves rocks from their banks downstream.
4	deposition	It is the process that lays sand down when the wind stops blowing.
5	delta	It is a landform of deposited sediments formed when a river meets a sea.

Give reason

1. **Gravity is one of the eroding factors.**
   because it pulls broken rocks down mountainsides
2. **The formation of sand dunes.**
   due to the deposition of sand carried by the wind
3. **Erosion and deposition are linked processes.**
   because deposition occurs when eroded sediments stop moving

What happens if

4. **Rain falls on hilly farmland?**
   rain washes the soil, causing erosion
5. **The wind stops blowing? (Concerning the process happening to sand)**
   sand will be deposited , forming sand dunes

words of the lesson

erode	يتأكل
farmland	الأراضي الزراعيه
landslides	الانهيارات الأرضيه
sediments	رواسب
setting	استقرار
beach	شاطيء
flach floods	الفيضانات المفاجئة
creek	ممر مائي
mud	طين
western desert	الصحراء الغربية
deposition	الترسيب
Hurricanes	الأعاصير
picks up	يحمل
remains	بقايا
peninsula	شبه جزيرة

Exercises on Lesson 3

Choose the correct answer:

1. is the moving of sand or rocks to another place.
   - a) Weathering b) Erosion c) Deposition d) Decomposition
2. The force of……….pulls rocks from the top of the mountain to its bottom.
   - a) river water b) seawater c) rainwater d) gravity
3. …………erode(s) rocks and soil from their banks.
   - a) Rivers b) Waves c) Rainwater d) Gravity
4. When a river carrying sediments meets a sea,………….. formed
   - a) canyon b) sand dune c) delta d) snow
5. …………is a process of settling rocks after moving to a new place.
   - a) Weathering b) Erosion c) Deposition d) Evaporation
6. Weathered rocks can be eroded by all the following factors, except………
   - a) gravity b) water c) sunlight d) wind
7. A gentle wind can form………..
   - a) a delta b) small sand dunes c) large sand dunes d) a mountain
8. …………occurs when eroded sediments stop moving and begin to build up
   - a) Deposition b) Erosion c) Weathering d) Photosynthesis
9. Wind can create a hill of sand called……….
   - a) delta b) a canyon c) a valley d) a sand dune
10. Gentle wind can carry sand grains for……….distance
   - a) short b) long c) huge d) very long

Put (✓) or (✕):

1. gravitational force can cause erosion of the rocks. ( )
2. Sometimes you can see erosion happening. ( )
3. As the wind becomes stronger, it carries the sand grains for a shorter distance ( )
4. After weathering, small rock particles pile up and aren't moved from their place. ( )
5. Sediments are deposited where they are eroded and picked up. ( )
6. Blowing sand grains from one place to another by wind is called deposition. ( )

7. A delta is a rectangular-shaped mass of sediment formed when a river meets the sea. ( )
8. Pulling sand from seashores by sea waves is called erosion. ( )
9. The deposition process never changes the shape of the Earth's surface. ( )

Mention the process from these words:

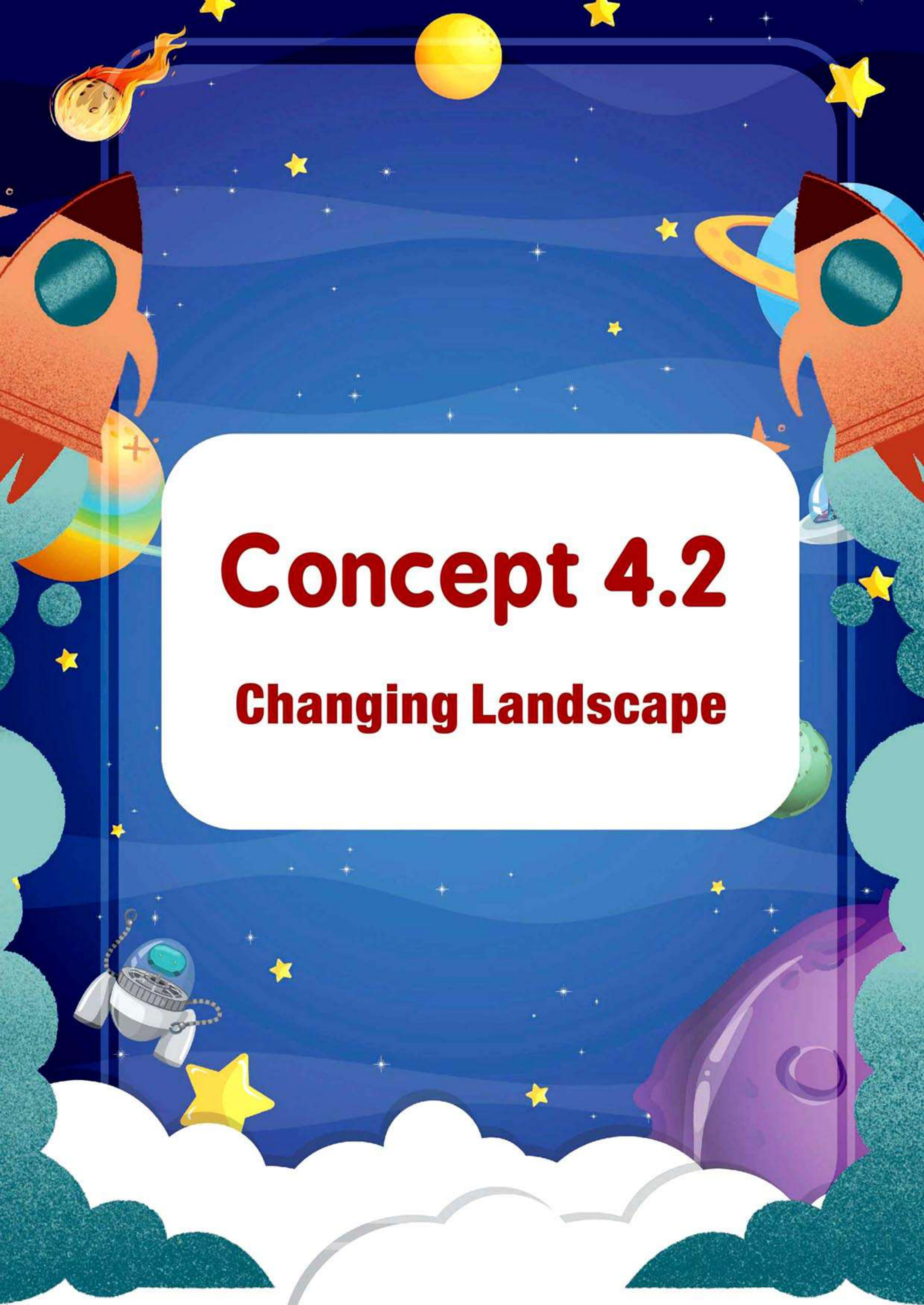
(Weathering - Erosion - Deposition)

1. Acid rain falls on rocks. (   )
2. The wind stops blowing (   )
3. The formation of sand dunes (   )
4. Hurricanes and floods (   )
5. Formation of the delta (   )
6. Pulling sand from the beach (   )

Complete the following using the words between the brackets

(water - Nile Delta - hurricane - deposition - gentle wind- Egyptian western desert)

1. A ……………forms a small sand dune, while a ……………. forms large sand dunes like that in……………..
2. ……………..is a fan-shaped mass of mud and sediments.
3. Wind,……………..and gravity are natural factors that control erosion process.
4. The process of laying down of sediment after its erosion is called ………………..



Concept 4.2

Changing Landscape

many factors can change and break down Earth's surface such as weathering, erosion and deposition and they form many landforms as canyons.

How are canyons formed ?

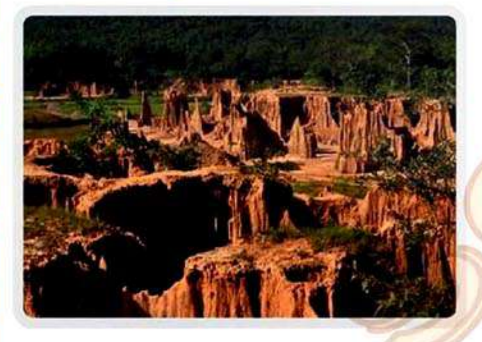
- Acanyon can be formed in many ways, such as weathering and erosion due to wind, water and other factors.
- Canyons can take millions of years to be formed.

When the water is moving over the sand,
- It pushes some of the sand out of the way.

As the water moves the sand,
- it leaves an impression of where the water flowed.

A stream of water may formed small canyon.

Small Canyons in Thailand



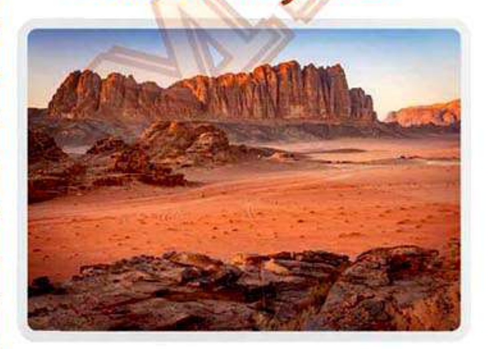
- Reddish

Wadi Nakhr in Oman



- Brown and Black

Wadi Rum in Jordan



- Reddish
- have V-Shaped

Colored Canyon in Sinai



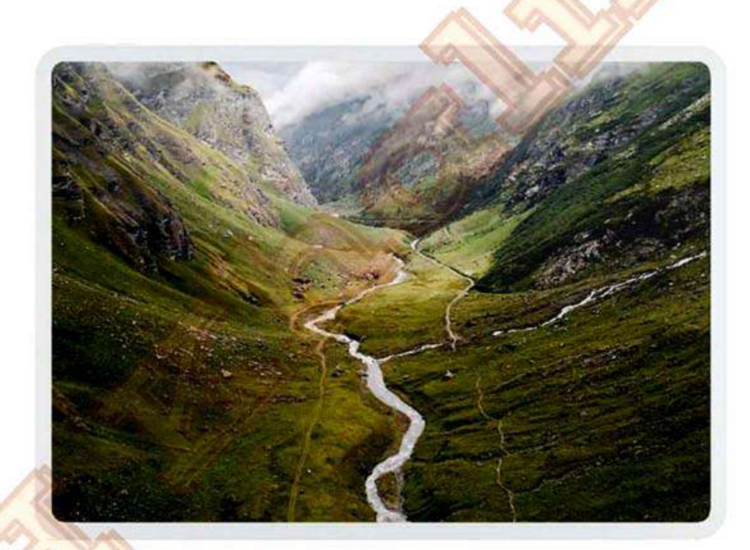
- Reddish
- have V-Shaped

Examples of some landforms:

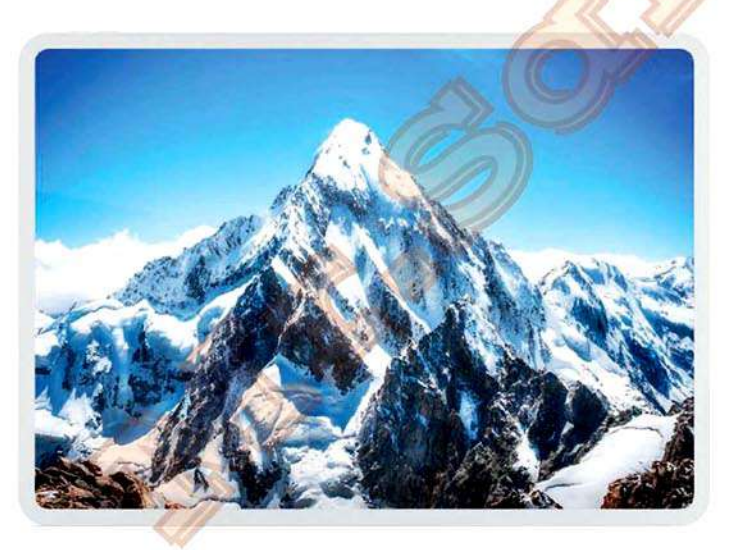
Canyon



Valley

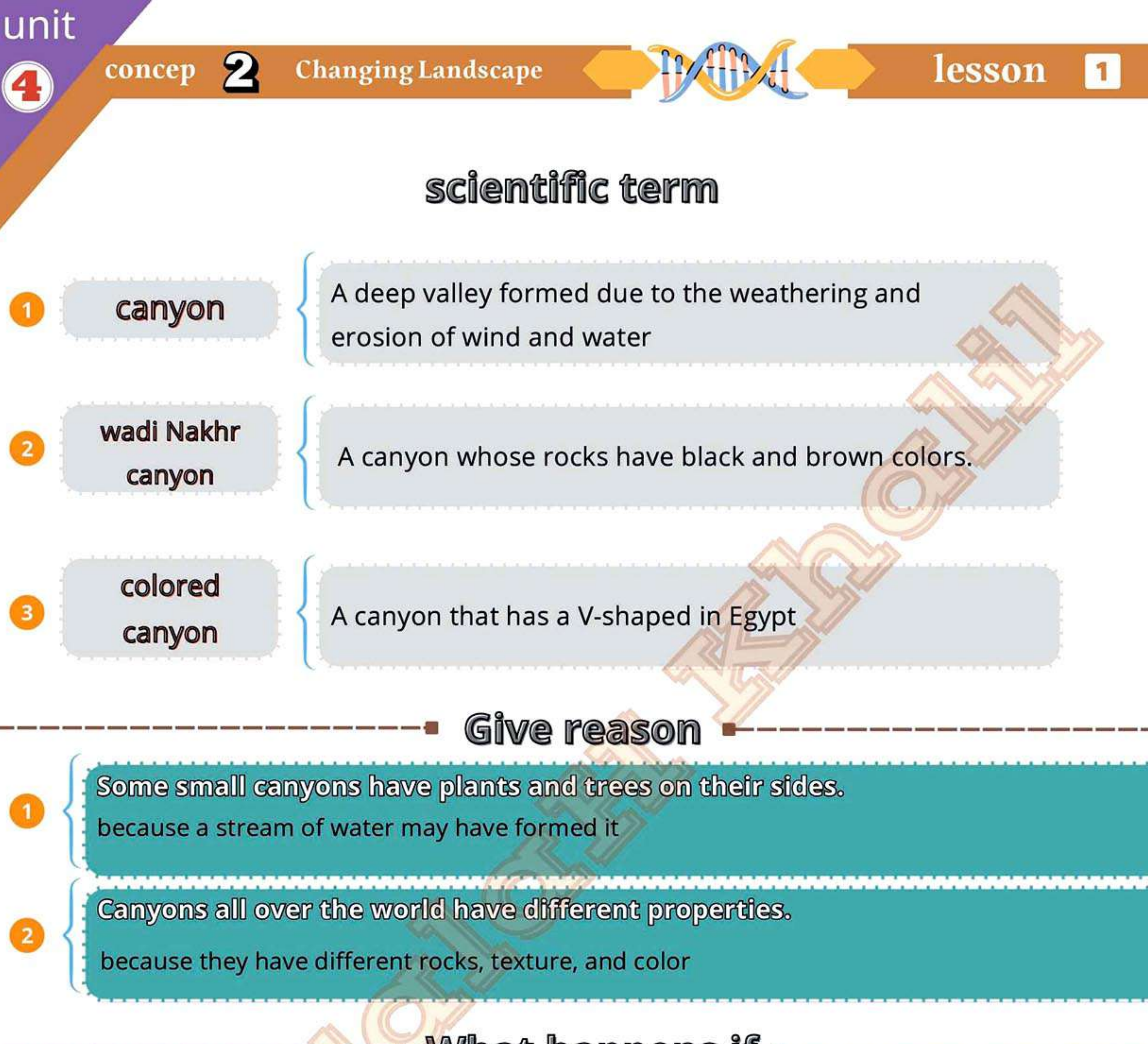


Mountains



Sand Dunes





scientific term

1	canyon	A deep valley formed due to the weathering and erosion of wind and water
2	wadi Nakhr canyon	A canyon whose rocks have black and brown colors.
3	colored canyon	A canyon that has a V-shaped in Egypt

Give reason

1. **Some small canyons have plants and trees on their sides.**
   because a stream of water may have formed it
2. **Canyons all over the world have different properties.**
   because they have different rocks, texture, and color

What happens if

4. **A water stream flows over a flat land?**
   it will leave impression and may form a small canyon
5. **A lot of rain falls on a small canyon?**
   the small canyon wil get depper

words of the lesson

gently sloped	منحدر قليل الميل
wearing sides down	تأكل الجوانب
probably	من المحتمل
deeper	أعمق
impression	اثر
push	يدفع
wear away	يسبب الأكل
Jordan	الأردن
texture	ملمس
Thailand	تايلاند
reddish color	اللون المحمر
remain	يبقى
valley	الوادي
landscape	مظاهر السطح
canyon	الوادي
landforms	التضاريس

Exercises on Lesson 1

Choose the correct answer:

1. A canyon may take..............of years to be formed.
   - a) hundreds
   - B) tens
   - C) millions
   - D) couple
2. All the following are examples of landforms found on the Earth's surface, except...........
   - a) canyons
   - B) dunes
   - C) buildings
   - D) mountains
3. Canyons can be formed in many ways, including
   - a) weathering only
   - B) erosion only
   - C) weathering and erosion
   - D) erosion and deposition
4. If the rain falls over a canyon for several times per year,.............
   - a) its depth increases
   - B) its depth decreases
   - C) it becomes flat
   - D) not be affected
5. On flowing water from a stream over flat land, a............may be formed.
   - a) large canyon
   - B) small canyon
   - C) hill
   - D) sand dune
6. Reddish small canyons found in..................
   - a) Egypt
   - B) Oman
   - C) Jordan
   - D) Thailand

Put (✓) or (✗):

1. Acanyon may be formed due to the effect of wind weathering and erosion. ( )
2. Wadi Rum in Jordan is an example of dune. ( )
3. When the water is moving over the sand, it leaves an impression on it. ( )
4. Acanyon is formed due to the effect of water stream on a flat land. ( )
5. Acanyon may take one year only to be formed. ( )
6. All canyons are similar in shape of rocks and colors. ( )
7. Earth's surface changes continuously as it is affected by weathering and erosion. ( )
8. Water streams that flow over flat land may form small canyons. ( )
9. All canyons must have V-shape. ( )

Complete the following using the words between the brackets:

(small canyon - impression - V-shaped - water stream - brown and black colored)

1. When the rain falls on a flat sandy land, it will leave an..............
2. Wadi-Nakhr is ....canyon.
3. Wadi Rum and colored canyon in Sinai are...............canyons.
4. In the beginning of a.................... formation, plants and trees grow at the two sides of it due to the effect of a.................




On a rainy day, you can see some changes in the landscape around you on the street.

You can see the broken bricks and rocks due to the growth of roots.



You can see cracks in the road.



You can see a patch of mud.



You can see the same processes happen in large landscapes in nature where :

1- Weathering process:

Instead of broken bricks and rocks due to the growth of roots.



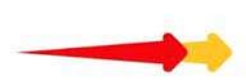
you can see a rounded, worn rock







2-Erosion process:

Instead of cracks in the road,  you can see the walls of the canyon were eroding due to the effect of water.





3- Deposition process:

Instead of a patch of mud → you can see a river making new landforms, such as a delta.





- Recognizing signs of weathering, erosion, and deposition is very useful.
  - Because it helps us build houses in safe places, where:
- People must not build a house on a hill that is eroding.
- People must not build a house very close to a river.
  - Because the river path may change, it may cause erosion and the deposition of houses.

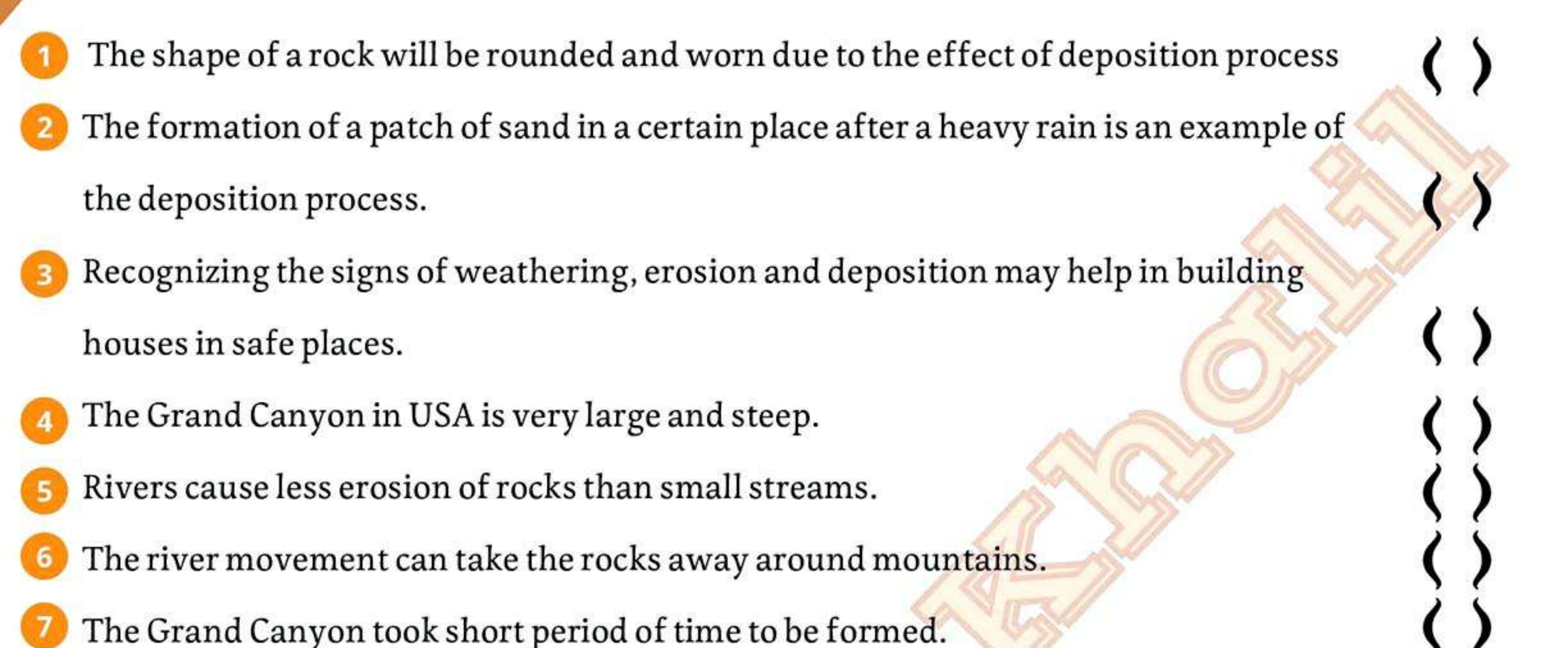
words of the lesson

English	Arabic
lead to	تؤدي
cut them deeply	قطعهم بعمق
downhill	انحدار
pull	يحذب
streams	تيارات
steep	انحدار
bottom	قاع
river	نهر
carve out	ينحت
pathways	الممرات
sediments	الرواسب
recognize	يتعرف على
rounded	مدور
worm	دُودَة
instead of	بدلاً من
washed away	جرفت
patch of sand	رقعة من الرمال
playground	ملعب
mountain	جبل

Exercises on Lesson 2

Choose the correct answer:

1. Among the evidence for the beginning of formation of small canyon by the effect of running water is..............
   - a) the deep slopes of its sides.
   - B) trees and plants that are growing on its sides.
   - C) the little amount of rains that flow over it.
   - D) the rocks and sediments that are found on its sides.
3. If the big rocks of a mountain were broken off, this is an evidence of
   - a) weathering process only.
   - B) erosion process only.
   - C) weathering and erosion processes.
   - D) weathering and deposition processes.
4. Recognize the sign of weathering, erosion and deposition may help in all the following, except......
   - a) building houses in safe places.
   - B) not building houses on hills that are eroding.
   - C) not building houses very close to a river.
   - D) building houses on a hill affected by erosion.
5. The rainwater gather in small streams due to THE vacances downhill. (Minia 2023)
   - a) pushing force of gravity
   - B) pulling force of gravity
   - C) cpushing force of friction
   - D) pulling force of friction
6. .... can erode valleys and form canyons across them.
   - a) Rivers
   - B) Mountains
   - C) Dunes
   - D) Rocks
7. The shape of the valley depends upon all of the following factors, except ....
   - a) type of rocks.
   - B) speed of the river.
   - C) size of rocks.
   - D) size of the river.
8. When the water of a river travels downhill on a steep slope, its speed ....
   - a) stays constant.
   - B) decreases to half.
   - C) decreases to quarter.
   - D) increases.
9. Rivers that flow fast can cause more .... than rivers with slow flow.
   - a) chemical weathering
   - B) erosion
   - C) deposition
   - D) formation



1. The shape of a rock will be rounded and worn due to the effect of deposition process ( )
2. The formation of a patch of sand in a certain place after a heavy rain is an example of the deposition process. ( )
3. Recognizing the signs of weathering, erosion and deposition may help in building houses in safe places. ( )
4. The Grand Canyon in USA is very large and steep. ( )
5. Rivers cause less erosion of rocks than small streams. ( )
6. The river movement can take the rocks away around mountains. ( )
7. The Grand Canyon took short period of time to be formed. ( )

Complete the following sentences by using the words below :

(speed — wind — sediments — valleys — gravity)

1. The sides of a mountain could be broken down by the effect of ....and weather erosion.
2. Canyon is a special type of.................. that has steep sides.
3. When the water of a river travels down a steep slope, its .... increases.
4. The force of water stream can erode a lot of............ of a mountain and carry them away.
5. Rainwater is pulled downhill forming small streams due to the effect of............

Canyon Formation

Many valleys, including canyons, are formed in the same way.

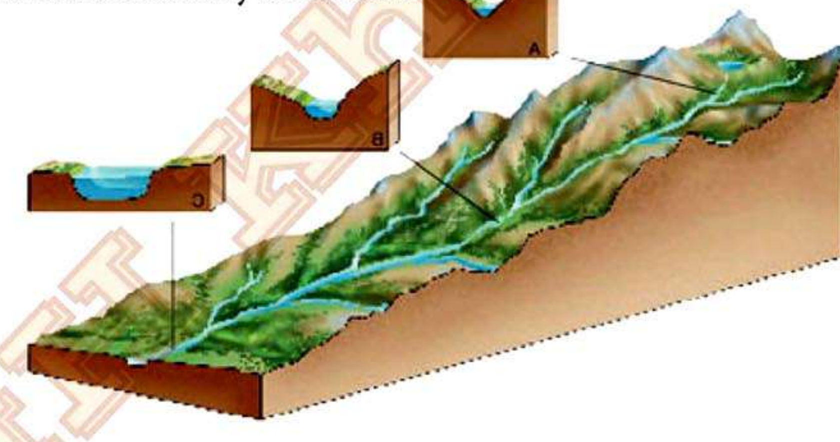
Stages of valley formation

1-Gravity pulls rainwater downhill, forming small streams.

2-Small streams are joined together to form bigger streams (rivers)

3-The water of the river moves fast and erodes (carves out) rocks in its pathway

4-When a river dries after a very long time, a new landform may be formed.



Factors affect the shape of the valley


1 The types of rocks

2 Speed of the river


3 Age of the river


4 Size of the river

NOTES

- Big streams or rivers cause more erosion than small streams.
- Fast-moving water causes more erosion than slow-moving water.

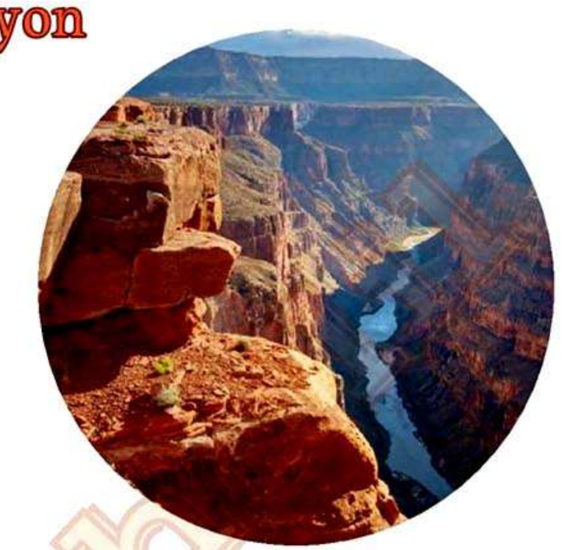
Canyons

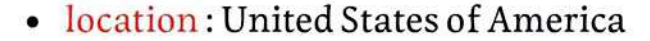
They are special types of valleys with steep sides.



- are exciting geologic landforms.
- people travel from all over the world to see and visit them.
- canyon is a landform that can be formed in many ways, including weathering and erosion by wind, water, and other factors.

The Grand Canyon





- location : United States of America
- age : It is millions of years old.
- shape:
  - -It is very large and steep.
  - -It contains many layers of rocks.
- There is a river at the bottom.

Formation of the Grand Canyon

1-Over millions of years ago, the water of the river was moving so quickly down a steep slope.

2-The force of this rushing water eroded a lot of sediment and carried it away.

3-This process took many millions of years and leads to the formation of the Grand Canyon.

Canyon and Valleys

	Valley	Canyon
Definition	Valleys are lowland areas. between mountains.	Canyons are special types of valleys with steep sides.
Differences	• The sides are gently sloped. • They are surrounded by a wide, flat plain.	• The sides are steep • They are surrounded by narrow and vertical walls • They usually consist of many layers
Similarities	• They are formed by rivers or streams. • They often have rivers or streams flow in the bottom.	



scientific term

1	gravity	A force pulls rainwater downhill, forming small streams.
2	canyon	A special type of valley with steep sides.
3	the grand canyon	The world's largest canyon, located in the USA.
4	Rivers	They are often found at the bottom of both canyons and valleys.

Give reason

1. **Valleys and canyons are formed in the same way**
   because they are formed due to the erosion by rivers or streams
2. **Rainwater is pulled downhill after falling on a mountain.**
   due to gravity

What happens if

3. **A river erodes the sediments of a mountain over a long period of time**
   a canyon may be formed
4. **The water of a river moves downhill on a steep slope?**
   the water speed increase causing more erosion
5. **Small streams of water join together? (Concerning erosion)**
   the water of the river will cause more erosion

words of the lesson

English	Arabic
responsible for	مسؤولة عن
Mediterranean Sea	البحر الابيض المتوسط
fertile soil	أرض خصبة
Cultivation	زراعة
wetland	الأراضي الرطبة
crops	المحاصيل
lies	تقع
northern coast	ساحل شمالي
characterized	تتميز
trapping	محاصرة
fine bits	قطع دقيقه
still water	مياه راكدة
silt	الطمي
clay	فخار / طين
sloped	منحدر
lowland	الأراضي المنخفضة
flat plain	سهل منبسط

English	Arabic
wide	واسع
similarities	التشابه
depth	عمق
narrow	ضيق

Exercises on Lesson 3

Choose the correct answer:

1. …………..pulls rainwater downhill, forming small streams.
   - a) Magnetism B) Gravity C) Sunlight D) Wind
2. …………….can cause more erosion.
   - a) A small stream B) A slow-moving river
   - C) A big river D) A river moving on a flat land
3. When a river flows over a surface and carves out it, a…………is formed
   - a) canyon B) delta C) hill D) mountain
4. The movement of sediments down a fast-moving river is considered………
   - a) weathering B) erosion C) deposition D) rusting
5. All the following factors affect the shape of the valley, except………..
   - a) the river's size B) the river's speed C) the rocks' type D) the rocks' color
6. A canyon and a valley are common in having………….
   - a) gently sloped sides B) rivers at the bottom C) steep sides D) vertical walls
7. A …………..is a deep valley with high, steep sides.
   - a) hill B) mountain C) canyon D) dune
8. …………are lowland areas with gently-sloped sides.
   - a) Valleys B) Deltas C) Canyons D) Dunes
9. A flowing river may form…………….
   - a) a valley B) a canyon C) a dunes D) a and b

Put (✓) or (✕):

1. When a river moves down a steep slope, its speed decreases. ( )
2. A canyon is a type of valley with steep sides. ( )
3. A river can erode a mountain in a short period of time. ( )
4. The Grand Canyon took millions of years to be created. ( )
5. The Grand Canyon has a river at its bottom. ( )
6. Canyon walls are not very tall and have gentle slopes. ( )
7. A valley has high and steep walls with many layers of rocks. ( )

Complete the following using the words between the brackets:

(less - high-more- gravity - increases - sediments - many layers)

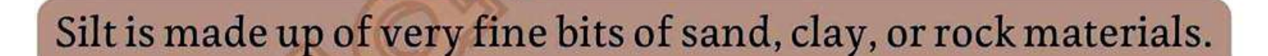
1. Rainwater is pulled downhill, forming small stream due to..........
2. When the water of a river moves downhill a steep slope, the water speed............that causes...........erosion
3. A small stream causes............erosion than a large river.
4. The force of rushing water erodes a lot of...........of a mountain and carried them away.
5. Walls of canyons are very..........and composes of...........

Delta Formation

Unlike valleys and canyons, deltas are not formed by erosion, but they are formed by deposition.

How is delta formed?

1. Fast-moving rivers carry sediments called silt.
2. The water of the river is full of sediment that has been collected along the journey.
3. When the rapid flowing water "of the river" enters still water "lake", or slower water "ocean or sea", water loses energy and drops the sediment that it is carrying forming a delta.



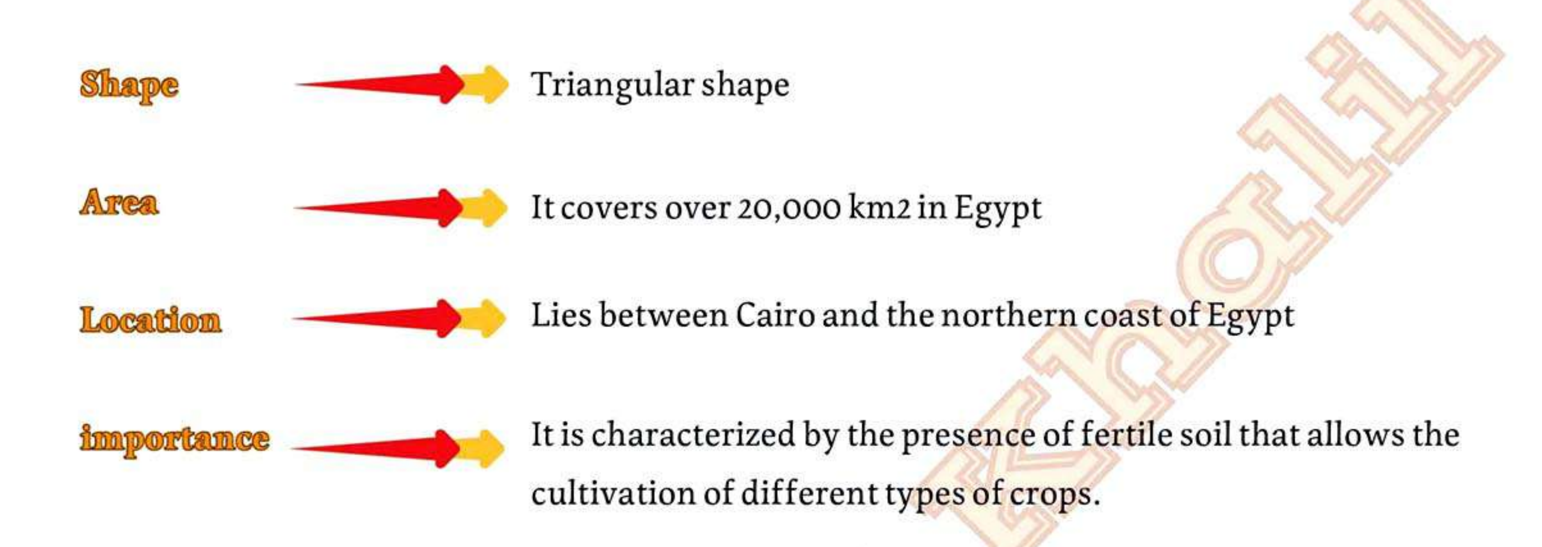
Silt is made up of very fine bits of sand, clay, or rock materials.

➔ The wetland of plants in the delta helps in increasing deposition

- Because plant's roots are responsible for slowing down the water



The Nile River Delta
"The most famous delta in the world".



Shape → Triangular shape

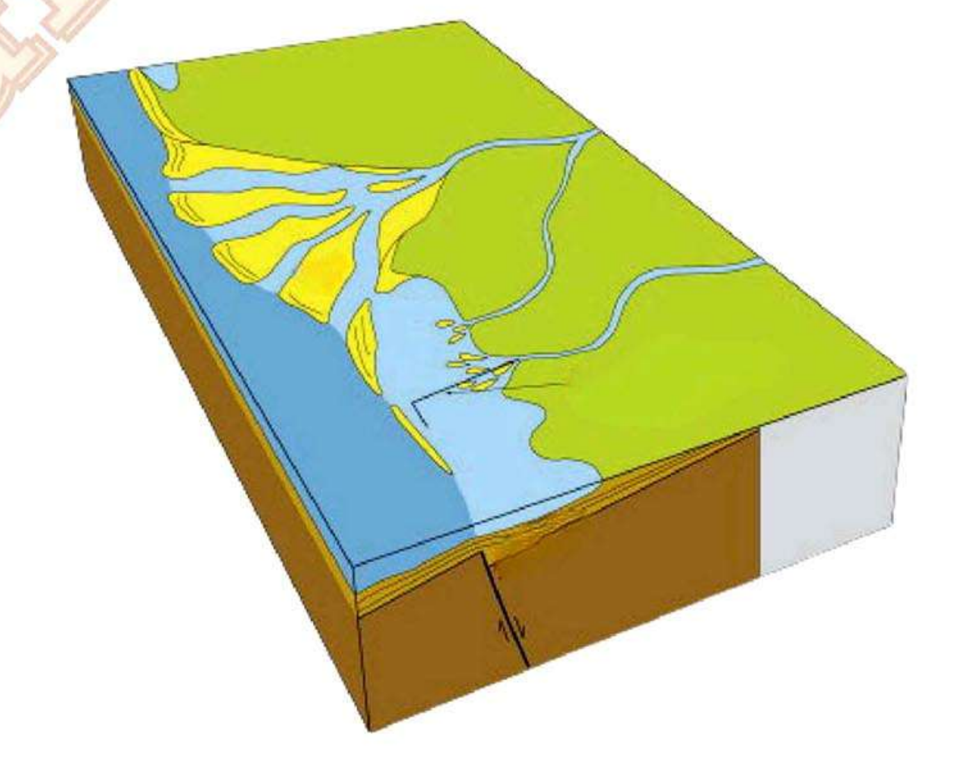
Area → It covers over 20,000 km2 in Egypt

Location → Lies between Cairo and the northern coast of Egypt

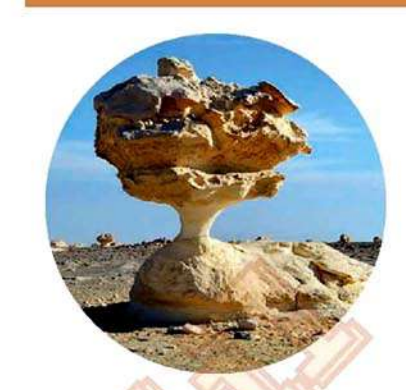
importance → It is characterized by the presence of fertile soil that allows the cultivation of different types of crops.

How the Nile River Delta is formed:

- The Nile River travels a distance of about 6,600 km to pour into the Mediterranean Sea, where it drops its sediments, forming the Nile Delta,



Wind Erosion



The wind in the desert can be a powerful force for change.

Steps of Erosion by Wind

1. when wind blows across the land, it picks up sand and other rock particles and carries them along.
2. when this flying sediment hits a rock, it wears down that rock like a sandblaster.
3. This process carves the rock into strange shapes.

Sand Dunes



- Shape : A hill of sand
- Location : - Sandy desert or sandy beach.
- Area :
  - -They are found in groups.
  - -They may cover a large area. (Hundreds of meters tall)
- Process ; Erosion and deposition.
- Factors : Wind-blown sand
- How they are formed? :
  - -Sand dunes are formed when a barrier like a rock blocks the wind-blown sand.



Sand Dunes Movements

1. When wind blows across a dune:
   - sand grains erode away from the side the wind is coming from.
2. The grains of sand are carried up by the wind along the slope of the dune.
3. When they reach the top:
   - the dune forms a barrier to the wind.
   - So, the sand grains roll down the other side.





- Sand moves by the force of the wind where:
  - As the force of the wind becomes weaker, the sand moves for a shorter distance.
  - As the force of the wind becomes stronger, the sand moves a longer distance.
- The distance that the sand grains move depends on the force of the wind.
- The way the sand moves depends on the direction of the wind.

- **Rivers cause the formation of valleys and canyons.**
- **Wind and sand work together as a force of erosion in the desert.**
- **Canyons and valleys are formed due to erosion by water and wind.**
- **Deltas are fan-shaped (triangular shape) landforms where river enter lakes, seas or oceans and they are formed due to deposition process.**
- **Sand dunes are formed due to erosion and deposition processes caused by wind.**

During a storm or a rockslide, erosion can happen quickly but in general, erosion happens slowly.

scientific term

	Term	Definition
1	slits	Sediments carried by a river that contains sand, clay, and rock materials.
2	delta	A fan-shaped land that is formed when a river meets a sea.
3	mediterranean sea	The sea in which Nile River Delta pours its water.
4	wind erosion	A process that causes the carving of rocks into different shapes by wind-blown sand.
5	sand dune	The landform that is formed by the erosion and deposition of sand.

Give reason

1. **Plants of wetland and their roots help in the formation a delta.**
   because wetland plants slow down water and increase deposition rates

2. **Silt carried by a river is deposited when the river enters the ocean.**
   because river water speed decrease

3. **Plants in wetland increase the deposition rate of silt carried by a river.**
   because wetland plants are responsible for slowing down the water

3. **Sand dunes are formed in a desert.**
   because sand dunes are formed when a barrier like a rock blocks the wind

What happens if

4. **A river carrying sediments meets a sea?**
   a delta is formed

words of the lesson

fan-shaped	على شكل مروحة
triangular shape	شكل مثلث
storm	عاصفة
rockslide	انزلاق صخري
barrier	حاجز
continuously	بشكل متواصل
sand grains	حبيبات الرمل
sandy desert	الصحراء الرملية
blow	ينفخ
picks up	يلتقط
sand dunes	الكثبان الرملية
block	حاجز
flying sediment	الرواسب المتطايرة
wears down	يتأكل
sand dunes	الكثبان الرملية
windblown	في مهب الريح

Exercises on Lesson 1

Choose the correct answer:

1. When a river meets a sea or an ocean, a landform known as a....... is formed.
   - a canyon
   - B volcano
   - C mountain
   - D delta
2. All the following are created by the water of rivers or streams, except a ....
   - a delta
   - B canyon
   - C valley
   - D sand dune
3. Silt carried by water contains all the following, except............
   - a sand
   - B clay
   - C rocks
   - D glass
4. ....is the main process responsible for the formation of deltas
   - a Deposition
   - B Erosion
   - C Weathering
   - D Photosynthesis
5. A delta is formed when a..........enters an ocean.
   - a lake
   - B river
   - C mountain
   - D hill
6. The Nile River Delta has.............
   - a a fertile soil
   - B a triangular shape
   - C an infertile soil
   - D a and b
7. A sand dune is formed by the ....process, then the.......... process.
   - a deposition - erosion
   - B erosion-weathering
   - C erosion - deposition
   - D deposition - weathering
8. Sand grains in the desert can move forward or backward depending on the............
   - a wind speed
   - B wind direction
   - C water speed
   - D water direction
9. Which of the following factors helps in the formation of sand dunes?
   - a Water
   - B Wind
   - C Light
   - D Heat
10. When a rock blocks the path of flying sand, a............may be formed
    - a dune
    - B river
    - C canyon
    - D delta

Put (✓) or (✕):

1. A delta is formed when the speed of river water increases. ( )
2. Plants of wetland and their roots don't affect the deposition process. ( )
3. Silt carried by a river contains large bits of sand and clay. ( )
4. Sand dunes are formed when a rock blocks water-blown sand. ( )
5. Sand dunes may be found in a sandy desert or on a beach. ( )

6. The Nile River Delta has fertile soil that allows the cultivation of different crops. ( )
7. Sand dunes are formed by the deposition process only. ( )
8. Sand grains are deposited on the same side of the rock where they are eroded. ( )
9. Wind can't break down a rock. ( )
10. Sand dunes are stable landforms that don't move. ( )
11. The formation of sand dunes in the Eastern Desert in Egypt is due to the movement of wind. ( )
12. Dunes are formed at the bottom of seas. ( )

Complete the following using the words between the bracket

(deposition - canyon - fan - decreases - increases - delta)

1. A .... is formed by the erosion process, while a.......... is formed by the deposition process.
2. The Nile River Delta has a..........shape.
3. When the stream water speed..............,it causes........... of sediments.
4. When the force of blowing wind .... the blown sand is carried for longer distance.


A bright path
to
excellence